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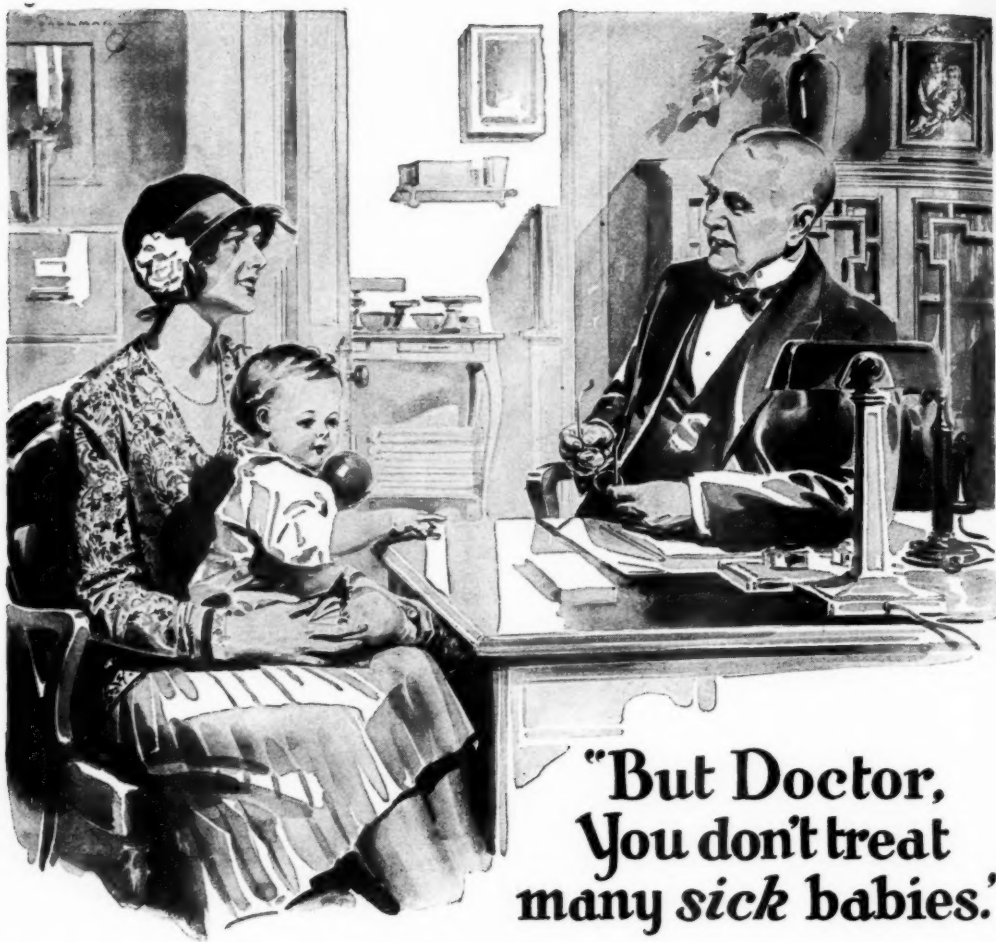
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FRACTURES OF BONES OF HAND AND FINGERS*

B. S. ADAMS, M.D.
Hibbing, Minnesota

FRACTURES of the bones of the hand, wrist, and fingers seem so unimportant that they are seldom discussed in medical meetings, and if a paper is printed on this subject, probably but few read it. In spite of the apparent simplicity and ease with which they seemingly should be reduced and held in good position and alignment, the results are so often unsatisfactory that they ought to be given more study and attention than they have received in the past. These fractures are important. They are major fractures. No part of the body is used so constantly, and so continuously, as the hands and fingers. Their functions are many and varied. The rapidly increasing use of machinery in all branches of industry renders a satisfactorily functioning hand of far greater importance than ever before. A review of cases coming before the compensation boards shows a very high percentage of hand injuries. According to reports from the Massachusetts General Hospital, these average 90 per cent of all compensation cases.

Actual experience shows that while a simple fracture of a metacarpal or phalangeal bone without displacement and in good alignment is one of the simplest and easiest fractures to treat, be they carpal, metacarpal or those of the forearm, the average case is far from simple, most of them are difficult to hold in good position and alignment, and many of them almost impossible.

CARPUS

In injuries of the carpus or wrist, the first difficulty encountered is diagnosis. A swollen, painful, tender wrist with restricted motion is very deceiving, and an *x-ray* film should be

taken, and carefully studied to determine the condition present.

The deformity may be but slight; injury to the radius and ulna, and also to the metacarpals, can usually be ruled out especially after an *x-ray* has been taken. Even then, the diagnosis may be hard to make, because there are eight small bones in a very small compact space, each bone overlapping the adjacent bones; and further, the average physician is not often called upon to treat carpal fractures, so it is hard for him to diagnose the true condition. An *x-ray* is absolutely necessary to make a diagnosis in most carpal fractures, and a stereo *x-ray* is of very decided advantage and, in all doubtful cases, should be taken. A stereo taken from the dorsal side and another stereo taken from the volar side will help. Note this—no examination of an injured wrist is complete until a lateral *x-ray* film has been taken. Only those who, like myself, have had the chagrin of missing a dislocated semilunar bone, can appreciate this. Such an error is sometimes very costly to the physician, or his insurance company. But unless one is exceptionally skillful in reading an anteroposterior film of the wrist, most dislocated semilunar bones will be missed. A lateral view is essential. The only time dislocated semilunars can be reduced is when they are fresh. After the acute swelling has gone, it is usually too late. Outside of severe crushing injuries which may fracture any, or all, of the carpal bones, the ones usually injured are the scaphoid or navicular, and the semilunar or lunate. The injury is usually a fall on the hand, or, what frequently amounts to the same thing, a blow on the palm, as by an auto engine back-firing while being cranked, the hand being pronated and hyperex-

*Presented in symposium at the annual meeting of the Minnesota State Medical Association, St. Paul, May 13, 1929.

tended, and in ulnar or radial flexion, the same cause that usually fractures the lower end of the radius. The scaphoid acts as a buffer between the os magnum and radius, the scaphoid giving way instead of the radius. The scaphoid is usually broken transversely across its neck. Cotton says, "Apparently, there is no considerable displacement in the majority of these cases immediately following the accident." Usually the patient has tried to use his hand, or manipulation has been attempted, and by the time an x-ray has been taken there is displacement of fragments.

Symptoms.—The wrist is swollen, but this swelling may be limited to the region of the scaphoid, instead of a general swelling over the entire wrist; tenderness is present between the end of the radius and the first and second metacarpal bones. Movement of the wrist is painful in any direction, but especially in dorsiflexion and radial deviation. The wrist is weak, the hand-grasp is poor, and a continuous ache is present. Pain and aching are increased by use and relieved by rest or immobilization. Stereo plates of the two wrists, palms downwards, thumbs together, ulnarly deflected, will usually give the best view for diagnosis. A lateral view should also always be taken, as the lunate bone may be dislocated in addition to the fracture of the scaphoid.

Treatment.—If seen early, and if not displaced, the treatment is dorsiflexion of the wrist and hand, including fingers, the hand and fingers being in the position of grasp—the thumb beneath index finger, and fingers slightly flexed. This position gives the most useful position for function, and it is the position of choice for all fractures of the carpus. A moulded plaster-of-Paris cock-up splint carefully moulded around the palm of the hand, and extending from near the elbow to finger tips, is satisfactory. Immobilization in this position should be retained at least three or four weeks in adults, after which a short cock-up splint may be used for one or two weeks, followed by a moulded leather wristlet. After this, massage, active motion, bathing with hot water, contrast hot and cold baths, are all necessary and important for two or three months.

In cases of malposition, if seen early, an attempt to replace should be made under ether, using strong traction with flexion and pressure

on the displaced bone. In cases where reduction is impossible, operation should be done, and two procedures are used. The most commonly used and generally accepted procedure is to remove the proximal fragment, or both fragments. More recently, bone graft operation has been used successfully by using a bone peg, as advocated at the Massachusetts General Hospital fracture clinic. Either of these operations is followed by a plaster-of-Paris cock-up splint for at least six weeks. Function following removal of part or all of the scaphoid is usually good. The reports of cases that have been grafted are very good. The best exposure for operation is through the dorsum of wrist, on the ulnar side of the long extensor tendon of the thumb. Incision on the palmar surface of the wrist, in addition, is necessary in some cases.

SEMILUNAR BONE

Fracture of the semilunar is quite rare, and when it does occur it is usually with dislocation.

Dislocation of the semilunar is not uncommon, and may, or may not, be associated with scaphoid fracture. The dislocation is nearly always anterior and caused by a fall on the dorsiflexed hand or a blow on the dorsum of the wrist in hyperextension. The distal carpal row of bones is carried backwards, leaving increased space between the os magnum and lower end of the radius. When force is applied, the lunate is forced forward through torn ligaments. The radio-lunar ligament usually holds, and this causes the bone to rotate, so its concave surface looks anteriorly instead of distally.

Symptoms are swelling of the wrist and unusual prominence on the anterior surface of the wrist. Pain and tenderness are marked and motion of wrist and fingers is very limited. Extension of the fingers and dorsiflexion of the wrist are impossible. An antero-posterior film of the wrist is apt to be deceptive and to lead any but an expert to believe no dislocation exists. A lateral view shows the very typical, and clearly visible dislocation of the bone, with characteristic forward-looking concavity.

Treatment.—If seen early, reduction may be effected by placing the hand in extreme dorsiflexion, making strong pressure with the thumb on the displaced bone on the anterior surface of wrist, then making extreme anterior flexion of

wrist. Repeated efforts under the fluoroscope are usually necessary. Similar motions may be used with the Thomas wrench, placing the distal end anteriorly.

If these attempts fail, or if the case is an old one, operation is needed to attempt reduction. Davy has made a bone skid with which he claims he has reduced dislocations of two months standing. If reduction is impossible, the bone should be removed, as a dislocated semilunar, if complete, or nearly so, leaves a badly crippled and very painful wrist. An anterior incision on the inner side of the brachioradialis tendon is used, care being necessary not to injure the radial artery or nerve. The results following removal should be good.

Fractures of the other carpal bones do occur, though rarely. Treatment is to reduce if possible, and put up on an anterior cock-up splint, with hand in position of grasp. If impossible to reduce, or if non-union occurs, excision must be done.

Kienbock's disease must be remembered in connection with wrist injuries. It is the result of a fractured semilunar bone, followed by absorption of the fragment. Diagnosis is made by x-ray film. The symptoms are pain and tenderness, localized over the semilunar, with wrist joint disability. In some cases the head of the third metacarpal is retracted. If seen early, conservative treatment may be used, but if late, operation is required. The results are not very satisfactory.

FRACTURES OF THE HAND

Fractures of the wrist are not very common, but when we come to the metacarpal and phalangeal bones, we enter a field of frequent injury. These bones are so accessible, so easy to feel, and the diagnosis usually so clear and plain, that it would seem that these fractures would be easy to treat. On the contrary the results are too often unsatisfactory, and anyone who has treated many of these fractures will, I think, agree that very many are extremely hard to hold in satisfactory position. The chief reason for this is the many and powerful muscles of the forearm and hand which are attached to these comparatively short bones, all of which are constantly pulling on the bones in varying directions. These forces tend to cause displacement of the broken fragments, with resulting deformities, stiffness,

and loss of motion. A review of compensation cases shows that a large per cent of smashed hands and fingers result in deformed hands or useless fingers. And with the use of machinery increasing rapidly, the number of injured digits is certain to continue high in spite of safety devices to prevent accidents.

One factor which has not been given sufficient consideration in the past in these fractures is the preservation of the normal arches of the hand. These arches are both longitudinal and transverse. The longitudinal arch not only conforms with the curve of the metacarpals, as well as each of the phalanges, having their concavity toward the palm, but, in addition, these arches are emphasized and increased by the muscle pads forming the thenar and hypothenar eminences, and also the enlargement at each end of the metacarpal bones, so that each metacarpal bone forms a longitudinal arch, that of the first, second, and fifth being more marked than that of the third and fourth. Transverse arches may be considered roughly as proximal and distal. The proximal arch is formed by the arching or bowing caused by the position of the carpal bones, and the heads of the metacarpal bones. The distal arch has a more gentle curve, and is formed by the enlargement of the distal end of each metacarpal bone. For good function, grasping power, free and easy movement of the thumb and fingers, the preservation of these arches of the hand is just as important as the preservation of the arches of the foot. In the treatment of the fracture of the hands and fingers, these normal arches and their preservation must be taken into consideration and carefully looked after.

With the development of the banjo extension splint for these fractures, one very important advance has been made; and if careful, intelligent, and very diligent attention be given from the start and carried on and maintained daily throughout the entire healing period, most of these fractures should give good results. But it is only by applying the right principles of treatment, together with constant watchfulness and very careful attention to details day after day, that we can expect to get that optimum triad of results, anatomical, functional, and economic, so repeatedly emphasized by Dr. Nathaniel Allison. The banjo splint "consists of a plaster casing of the forearm with palmar sup-

port, in which is incorporated a rectangular frame of iron wire, to which the rubber tubing or elastic bands which take the extension from the digits is attached. The splint may be modified according to the number of fingers involved. The amount of traction is not very great, but it should be maintained until callus has been thrown out, usually a matter of ten to fourteen days. The palmar portion of the splint should be moulded into the arches of the hand in order to preserve their contour and cut out freely about the thenar eminence to allow movement of the thumb." (Wilson and Cochane, p. 310.)

This traction may be used with cock-up, straight, or dorsiflexion position, or lateral extension as for the thumb. In making this splint, use ten or twelve gauge wire; the wrist should be well padded with saddler's felt or plenty of cotton wadding. Rubber bands for traction may be attached to the fingers either with lateral strips of adhesive plaster held with circular turns near the base or with Heusner's glue, which is made as follows:

A. Resin (Powder)	50 grm.
Alcohol	50 grm.
B. Benzine	25 grm.
Venice turpentine	25 grm.
Mix A and B.	

METACARPAL FRACTURES

The first metacarpal bone is usually broken at or near the base and may be one of three kinds. First, those not involving the joint surface are usually impacted with shortening of the bone, and are caused by a blow on the end of the thumb. Second, the stave fracture of Bennett is an oblique fracture of the proximal end of the bone running through the base upward and backward, the upper end of the lower fragment being displaced upward and backward. This occurs only in adults. The third kind is the separation of the epiphyses from the shaft, the fracture extending into the shaft.

The symptoms are pain, swelling, deformity, tenderness, and crepitus, unless impaction has occurred. Extension in a banjo splint should be used for Bennett's fracture, and for all displaced fractures. Of all the fingers of the hand, the thumb is the most important and the hardest to get along without. For this reason, every effort should be made to get the best possible result in all thumb fractures. While extension treat-

ment is agreed upon by all, there has been considerable discussion as to whether the thumb should be in the position of grasp, the most favorable position if a bad result follows and especially if motion is badly limited, or in marked abduction. Extension in abduction seems the position of choice for Bennett's stave fracture. For the other fractures, the fluoroscopic examination will usually be the guide; if in doubt put up in position of grasp.

Fractures of the shaft also occur and usually are the result of a direct blow. Shortening may result and is best determined by comparing the relation of its tip on the index finger with that of the other hand. Splinting the thumb in abduction may be tried; if that does not hold, use extension in abduction with the banjo splint.

Fractures of the other metacarpals may be at the base, in the shaft, or at the knuckle. Displacement may be absent or it may be very great. The great tendency in these fractures is for the distal end of the bone to drop, causing deformity of the knuckle line, and resulting in difficulty in flexing the fingers, and a weak grasping power. Both the longitudinal and transverse arches are impaired, and if the deformity is not corrected the lumbricale and interossei muscles cannot act normally in fixing the metacarpo-phalangeal joint; this in turn interferes with the long flexor tendon in flexing the terminal phalanges. With the fingers flexed, an examination of the knuckle line will usually show whether or not a fracture or dislocation with displacement exists, unless the swelling is very great. In such cases, an x-ray will show, and should always be taken. Very frequently several metacarpals are broken. Fractures of the shaft are usually due to direct violence. Knuckle fractures are usually the result of fighting. The fourth and fifth metacarpals are the ones usually affected. They consist of a break, usually oblique upward and backward just back of the expanded head. There may be apparent over-riding or impaction of the parts, but true impaction is not common.

The treatment of a broken metacarpal with no displacement is simple. All that is really needed is to keep the hand in a sling to prevent use of the hand. In most cases, however, a straight splint is advisable, as most patients will try to use their hand, and cause a later displacement, or delayed union. In displaced fractures, and this includes the great majority, reduction and retain-

ing in good position is very difficult. The method of flexing the fingers over a bandage roll and binding them with adhesive tape and a bandage is given in all the textbooks, but usually leaves a crooked bone and a dropped knuckle, with a weak grasping power. Extension after ether reduction gives the best result, and should usually be used. Straight extension should usually be used, sometimes hyperextension, and occasionally partial flexion. The fluoroscope will aid in determining the position. These bones require three to four weeks for union, and must be immobilized that long, and often longer. Start active motion of the fingers as early as possible. Heavy work should not be allowed for six weeks.

PHALANGEAL FRACTURES

Fractures of the phalangeal bones are of more frequent occurrence than those of the metacarpals, and require a great deal of care to get good results. Most finger fractures are the results of a direct blow, and consequently, may be in any part of the bones and range from a simple transverse fracture with no displacement, to a badly comminuted bone, with splinters pointing in various directions. Being superficial, these fractures are easily diagnosed, but an x-ray film gives more detailed information than palpation alone.

In a simple fracture without displacement, all that is needed is a tongue blade extending along the finger and, if it is the proximal phalanx, back onto the hand. This splint should be retained two to three weeks, at which time union should be present. Fractures with displacement must be reduced, and it is often difficult to hold them in good position and alignment. If reduction is easy, and there is not much tendency to become displaced, a simple splint such as a tongue blade, or a piece of tin or an aluminum splint is all that is needed. But in many broken fingers, especially when comminuted, a splint is not effective, and extension is required. For this, a small banjo extension splint is the most effective, and the most comfortable to wear. A small wire extension splint having its base in the form of a saddle, which rides on the web on each side of the finger is efficient, but usually painful to wear, even when well padded. Extension should be continued two to three weeks. Extension may be made with adhesive tape along

the sides of the finger, or with a glove finger attached with Heusner's glue. In some cases, a hole drilled through the finger nail, through which a piece of silk is threaded, will be more satisfactory, or direct skeletal traction may be needed, and can be obtained by passing a stout needle through the terminal phalanx.

Another form of finger fracture that is often seen is the mallet or baseball finger, in which the end of the finger is struck, leaving a flexed terminal phalanx, which can be extended by passive but not by active motion. In these cases there is usually an extensor ligament torn loose by flexion being forced against the resistance of the extensor tendon, or the piece of bone to which the extensor tendon is attached has been torn off by avulsion. The best treatment is hyperextension of the terminal phalanx, using a palmar splint bent upward near its end at a forty-five degree angle.

As free motion is the most important function of the fingers, active motion of the fingers must be started as early as possible. Early movement of the fingers should always be active, produced voluntarily by the patient flexing and extending his muscles himself, and never by an attendant. In most fractures, after a short period of complete immobilization, retention or extension splints may be removed daily to allow the patient to actively move his fingers. Care and supervision should be used to prevent displacement. If done carefully the period of disability can be shortened very considerably.

Compound fractures of the fingers are frequent, and are often very severe. The blood and nerve supply, however, is so abundant that one should never amputate, except in very exceptional cases, until after several days have elapsed to be sure that repair is impossible; sometimes seemingly hopeless cases result in useful fingers. This is especially true of the thumb. Even a stiff, immobile, weak, and deformed thumb is better than none, and a surprising amount of grasping power is possible with only a stump of a thumb. A few days waiting will cause no damage, but a finger that has been amputated can never be replaced. The reparative power of the fingers is wonderful, and this is especially true in children and youths. Fingers in children that are nearly severed will sometimes grow and become useful. Even in adults, fingers that are so badly crushed that repair seems impossible at

first examination will sometimes heal and become serviceable. A smashed joint may be debrided, and soft tissue transplanted into the space between the bone ends and a new mobile joint formed. Tendons can be sutured at the time of repair or later. In some cases, tendon transplant may be needed. Skin transplants and skin flaps may be needed to cover denuded areas, or an end that has been cut off. Even a bone graft may sometimes be needed to fill in crushed bone. To get good results the wound must be kept clean and free from serious infection. A badly infected finger is hard to save, and seldom becomes useful, unless it be the thumb. But it is so easy to amputate later, if a badly deformed or stiff finger results, that conservative efforts should always be tried, unless gangrene develops; and even then save all that shows any possibility of being useful. In severe multiple injuries of the fingers, it is sometimes advisable to allow the gangrenous parts to almost slough off so as to save every bit of finger possible; and then

cover the ends with skin graft or flap, or even allow them to heal by granulation. It is surprising what satisfactory stumps occasionally follow this method, unscientific as it may sound. The treatment that is best is that which will give the most useful hand.

In conclusion, I wish to emphasize the following points:

1. Injuries of the wrist are very deceptive, and a fracture or dislocation is easily missed.
2. Fractures of the hand, and the hand includes the wrist and fingers, are serious fractures.
3. The large number of poor results in these fractures indicate that more care and attention should be given these injuries than has been done in the past.
4. Maintaining the normal arches of the hand is necessary for good function.
5. Use conservative treatment in severe injuries of the fingers.

FRACTURES OF THE WRIST*

M. H. TIBBETTS, M.D.
Duluth, Minnesota

MANY years ago there must have been an elderly female who, having fallen on her outstretched hand, received such an injury that she could not move her fingers. Later, discovering that her wrist was broken, she must have decided that if one broke a wrist one could not move the fingers of this hand. Arguing conversely, if the fingers could be moved, the wrist was not broken. This myth has been handed down for generations. Many fractures are therefore missed because the fingers move and to the lay eye there is no obvious break. Darrack must have had a similar situation in mind when he said, "Anyone who has fallen on an outstretched hand or experienced a backfire while cranking a car, and who has localized tenderness over the lower end of the radius, with some disability of the wrist, may be considered to have a fracture of the wrist until it is proved otherwise."

In this presentation I have no new method of discovering all of these common fractures, nor having discovered a fair proportion have I any panacea that will insure one hundred per cent cures. My endeavor is to review the generally accepted procedures that have proven satisfactory. By means of lantern slides I wish first to show certain normal relationships which are important in making a diagnosis and, later, in determining the efficiency of the reduction; second, to show various types which may be encountered; third, to give a brief discussion of diagnosis; and, fourth, to discuss treatment.

It is not necessary to point out that the styloid process of the radius is on a lower level than that of the ulna. Less obvious is the fact that the articulating surface of the radius is also slightly lower than the corresponding portion of the ulna. Remembering this will aid in determining whether the normal relation has been restored between the radius and the ulna at their lower articulation after reduction. Restoring this articulation is of great importance, for without the smooth gliding surface of the former

position there will be persisting pain on rotation. If one were to draw a line through the antero-posterior plane of the lower articulation of the radius, it would make approximately a right angle with the shaft of this bone. After fracture, the restoration of this angle means the correction of any tilting of the lower fragment, thereby insuring the path for normal extension and flexion.

Two further anatomic shadows, that at times may tend to confuse the picture, must be pointed out. The lower end of the radius dips downward or toward the ventral surface of the wrist rather abruptly. It is easy to interpret this as a displacement. The other shadow is made by the ulna which, in a truly lateral view, is superimposed upon the radius. The difficulty arising from this double picture may be obviated by identifying each cortex at a higher level in the forearm and following it to its lower extremity.

Turning to the types usually seen, the common Colles fracture may be a simple transverse break from one-half to one and a half inches above the lower end of the radius. The distal fragment may be displaced dorsally. Impaction may or may not exist. If the dorsal surface alone is impacted, the angle of the articulation with the shaft becomes acute dorsally. If the lower cortex alone is impacted, the dorsal angle becomes obtuse and we have a reverse Colles. The Colles fracture may also exist with varying degrees of comminution and displacement.

The so-called backfire fractures resulting from the back-kick of a motor frequently show a single transverse line of fracture beginning directly in the joint surface near the ulna and extending toward the radial side of the wrist, as though the styloid and a part of the lower end of the radius were sliced or split off, or the carpal scaphoid acting as a wedge splits off the styloid. Often there is no displacement. These may be readily missed without the x-ray. Not all, however, are thus simple. Great comminution may simulate a bag of gravel.

Diagnosis may be simple if the classical "silver

*Presented in symposium at the annual meeting of the Minnesota State Medical Association, St. Paul, May 13, 1929.

fork" deformity is evident. If seen early there may be a typical localized swelling over the carpal area, but this is soon overshadowed by diffuse edema of the hand, wrist and lower arm. When the styloid of the radius is higher than that of the ulna, the evidence is convincing. It is well, of course, to compare with the sound wrist, as an anatomic variation may exist. Point tenderness is very important, as is crepitus when elicited, but no great effort should be expended to produce the latter. Otherwise comminution may thereby be increased. X-ray is the final evidence and should always be resorted to, even though a fracture is obvious. The aid thereby afforded in determining the maneuver of reduction is invaluable.

I believe that it is impossible to reiterate too frequently the need for early treatment once the diagnosis is established. In the event of much swelling, which is the usually advanced excuse for delay, the statement stands. Reduction is the quickest way of reducing swelling; it lessens hemorrhage from the bone ends, and makes more room for venous return.

The type of maneuver employed to accomplish reduction is unimportant so long as four things are achieved: First, the thorough breaking up of the impaction before attempting any replacement; second, the overcoming of any tilting of the lower fragment; third, the restoration of the normally lower articulation of the radius; and, fourth, the re-establishment of the articulation between the ulna and the radius. With these four steps accomplished, the next necessity is the maintenance of reduction. Here again the type of immobilizing device may vary with the

individual. Some may use a plaster cast, others a molded plaster splint, and still others a metal splint. Perhaps one of the simplest and at the same time efficient methods is the use of the basswood splint. These splints are shaped to maintain ulnar deviation of the hand; they are cut out above the ulnar styloid, are well padded, and held in place with adhesive and bandage; they are easily removable for massage and heat.

The after-care demands adequate physiotherapy. The posterior splint may be removed after a few days and heat, combined with light massage, should be instituted. After this treatment, of course, the posterior splint is reapplied. If there is no marked tendency to recurrence, active motion may be started at the end of a week, for a short period. Where much comminution is present and there is a tendency for a recurrence of the deformity, I believe that immobilization should be undisturbed during the first ten days or two weeks. A leather wristlet may be substituted for the wooden splint after three or four weeks.

To recapitulate: Certain anatomic relations must be remembered in determining the diagnosis, the method of reduction, and in interpreting the efficiency of the reduction. X-ray clinches the diagnosis and should always precede reduction, even though fracture is obvious. In treatment there should be no delay. The important technical steps are thorough freeing of any impaction, correction of tilting of the lower fragment, correction of shortening of the radius, and the re-establishment of the lower radial ulnar articulation. In the after-care physiotherapy is all-important.

FRACTURES OF THE LOWER END OF THE HUMERUS*

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IT is proposed in this necessarily brief survey of fractures around the elbow joint to limit the discussion to those involving the lower end of the humerus, for these are of course the most important as they greatly outnumber fractures of the upper end of the ulna and radius. To understand and treat these fractures properly it is absolutely necessary that the structure of the parts involved be thoroughly understood.

The lower end of the humerus flattens out in an antero-posterior direction and broadens out toward the two sides, the supracondylar ridges on the sides of the lower end of the shaft running down to terminate in the internal and external epicondyles respectively. The extremity of the bone is furnished with two articular surfaces, the capitellum and the trochlea, the former being a rounded eminence to articulate with the head of the radius and the trochlea a grooved surface with prominent edges in which the ulna articulates with the humerus. These, with the epicondyles, form the condyles and are placed at an angle of about 85 degrees with the shaft, thus accounting for about one-half of the carrying angle of the elbow, the other half being, of course, due to obliquity on the ulnar side of the joint. Viewed from the side, the lower end of the humerus is club-shaped and inclined forward so that in adult life about two-thirds of this end lies anterior to a line bisecting the shaft of the bone, while in children up to nine or ten years of age the entire capitellum lies anterior to this line. Just above the capitellum and trochlea anteriorly are the radial and coronoid fossæ and posteriorly, opposite to these, is the olecranon fossa. The capsule of the elbow joint is attached anteriorly just above the articular margin but posteriorly it is continued upward so as to envelope the olecranon fossa. On the sides it is attached near the bases of the epicondyles. The external epicondyle is the site of the origin of the common tendon of the extensor muscles of the forearm, while on the internal epicondyle is found the origin of the common

tendon of the flexor muscles and the pronator radii teres. The ulnar nerve runs in a groove on the posterior surface of the internal epicondyle and is in close relation to the bone at this point.

Ossification of the lower extremity of the humerus develops from four centers, the first to appear being that for the capitellum during the second and third year. Extending upwards this center forms the outer half of the trochlear surface, the center for the inner half not appearing until the tenth or twelfth year. The center for the internal epicondyle appears about the fifth year while that for the external epicondyle is not present until the twelfth or fourteenth year, when it rapidly joins the capitellar center. The internal epicondyle unites as a rule separately to the diaphysis, while the other three centers form the lower epiphysis. This unites to the shaft during the sixteenth to seventeenth years but sometimes earlier.

The fractures of the lower extremity of the humerus may be divided into: Supracondylar, transverse dicondylar, those of the external and internal condyles, "T" or "Y" fractures (the so-called intercondylar), epicondylar and epiphyseal separations.

The supracondylar fractures are the common elbow fractures in children and are due either to: (1) a fall on the outstretched hand; (2) less commonly, a fall on the point of the flexed elbow; (3) more direct injury with the elbow extended. With these fractures there is always more or less displacement of the distal fragment. Following falls on the outstretched hand occurs the so-called "extension type" of fracture with the distal fragment displaced backward and the line of fracture oblique, running downwards and forwards. In the less common type due to falls on the flexed elbow we encounter the "flexion type" of fracture with the obliquity in the opposite direction and the fragment displaced forward. This latter fracture is the usual one in adults while the former is the common one in children. In both types of fracture the periosteum is frequently stripped for some distance from the shaft of the bone and the fragment

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rotated inwardly and displaced to the lateral side. This displacement of the fragment is due to the fracturing force, the direction of the line of fracture, and the pull of the biceps, triceps and brachialis anticus. Supracondylar fractures are never impacted and usually cause some distortion of the carrying angle. Although nerve injuries are not the rule with this type of fracture the radial, and, less commonly, the median nerve may be involved and for this reason an examination should always be made for such injuries before any treatment is undertaken. The pulse and circulation should also be investigated on account of the liability to injury of the adjacent blood vessels. Although Volkman's contracture can not be discussed here it is an ever present danger in these cases and must always be kept in mind.

With transverse dicondylar fractures we find that the etiology is practically the same as for the supracondylar type, especially a fall on the extensor surface of the forearm. With this fracture there is a transverse line passing through the olecranon fossa which of course makes the fracture intra-articular and causes a hemarthrosis. The displacement of the fragment is usually slight but may be in any direction and the fragment also may become impacted.

Fractures of the external condyle, which are more frequent than those of the internal condyle, are due to a fall on the hand with the force directed upwards through the radius to the capitellum or to a fall on the inner aspect of the olecranon with the elbow flexed and the force transmitted outward to the external condyle. More rarely this fracture may be caused by direct injury to the outer side of the elbow and extended forearm with the pulling off of the external condyle through action of the external lateral ligament. In this fracture the line passes obliquely upward, separating as one piece the capitellum, the outer edge of the trochlea, and the external epicondyle from the rest of the bone. The fracture is rarely impacted and the fragment is usually displaced upward, outward and forward and is frequently rotated. As the result of the displacement there is a distortion of the joint line and an irregularity of the joint surface and therefore a change in the joint axis and carrying angle. Of course this fracture is also intra-articular.

Fractures of the internal condyle are usually

due to direct violence such as a fall on the flexed elbow, the force being transmitted through the olecranon to the internal condyle. This fracture also sometimes accompanies posterior dislocation of the elbow. The line of fracture runs from the center of the trochlea obliquely upward to above the internal epicondyle. The fragment may be displaced in the same general way as the external condyle in its fractures and this displacement leads of course to a loss of the carrying angle.

"T" or "Y" fractures are due usually to falls on the point of the elbow with the ulna driven upward into the trochlea as a wedge separating the condyles. The fractures may also be caused by the shaft of the humerus being driven down between the condyles after a supracondylar fracture has occurred. A direct crushing or twisting force at the elbow may of course also cause this type of lesion. These fractures are distinctly an adult injury and are only rarely found in children. The damage is very great as the condyles are broken off and frequently comminuted. There it is no typical displacement of the fragments but they may be rotated or twisted out of place in any direction. There is always a marked disruption of the elbow joint and frequently marked involvement of the soft parts.

Fractures of the epicondyles, both internal and external, are due to direct injury or to hyper-abduction or hyper-adduction of the elbow joint. Fractures of the internal epicondyle are the more common, but, as displacement of the fragments is never great, the lesions are not important. With involvement of the external epicondyle the line of fracture may be intra-articular, as the capsule is inserted well up towards its apex.

Epiphyseal separations may occur up to the time of their union with the shaft but there is no typical displacement and they are relatively unimportant. Etiologically they are due to the direct or indirect forces mentioned under the various fractures. The capitellum may alone become detached at times with marked displacement even up to complete rotation. This latter lesion is one of the common causes of delayed ulnar nerve palsy.

The rare fractures of the lower end of the humerus are those of the trochlea and capitellum. On account of this rarity no extended discussion of them is necessary.

The diagnosis of the various types of fractures

of the lower end of the humerus may not be difficult if the cases are seen early before any marked swelling has masked the findings. The distortion of the joint, the change in the carrying angle and the points of tenderness are the important factors. The radiograph of course gives one the final accurate diagnosis and all cases should be examined with the *x*-ray taken in at least two planes.

The treatment of fractures of the lower end of the humerus involving the elbow must be directed toward the restoration of the normal anatomy with special attention to the preservation of the clubbing of the lower end of the bone and the carrying angle. To accomplish the proper result the fragments must first be reduced and then a dressing applied which will hold them in the right position while healing is taking place. With supracondylar and transverse dicondylar fractures and with the epiphyseal separations reduction must practically always be made under an anesthetic. With the fragment displaced posteriorly the manipulation should consist of traction, hyper-extension of the elbow with angulation at the site of fracture, slipping forward of the fragment and then acute flexion of the elbow to draw the fragment into proper alignment by the tightening of the triceps tendon. The taut tendon will then hold the fragment in position. If this procedure can be done under the fluoroscope the replacement of the fragment can be more accurately determined but this fluoroscopic examination is much more important where the fragment has been displaced anteriorly. Rarely open operation with reduction of the fragment and internal fixation is necessary. If the forearm is accurately flexed into such a position that it lies directly on the arm the carrying angle is preserved and no marked deformity of the elbow can result. The position of acute flexion should be the one of choice for all the fractures mentioned unless there is some distinct contra-indication as shown by interference with the circulation or displacement of the fragment. To hold the arm in this position there are several types of dressings which can be used. The most common of these are: (1) hyperflexion bandage of Ashhurst with the wrist tied to the neck; (2) the lateral hyperflexion plaster-of-Paris dressing; (3) the posterior moulded plaster-of-Paris splint with fixation of the shoulder if necessary;

(4) the collar and cuff attachment of Jones; and (5) adhesive plaster strapping. These dressings should be kept on for about three weeks in children and four weeks in adults, after which a simple collar and cuff or ordinary arm sling can be used for from one to two weeks with the elbow carried around a right angle. In simple cases with good reduction careful active motion can be started in ten days to two weeks, although with the less satisfactory and comminuted cases this time must be lengthened. Massage and baking can be started when consolidation is sufficient to allow their use. With the transverse dicondylar fractures the period of fixation must be slightly lengthened (about four weeks in children and five weeks in adults) and active motion delayed to the third or fourth week.

Fractures of the internal and external condyles call for operative interference more often than supracondylar or transverse dicondylar fractures but otherwise their reduction and retention follows along the same lines as those just outlined.

Fractures of the epicondyles need no reduction as a rule and the simple moulded splint or body swathe with the elbow in acute flexion is all that is necessary for fixation. Gentle motion can usually be started during the first week but the fixation should continue for about three weeks.

The reduction of "T" or "Y" fractures is sometimes extremely difficult or even impossible. The same general procedure as for supracondylar fractures with moulding of the condyles together by lateral pressure is sometimes sufficient, especially if the work is done under the fluoroscope. Where reduction can not be accomplished by this method, bed traction with the elbow at a right angle may be tried but open reduction of the fragments with internal fixation is frequently necessary. After reduction of these fractures the arm should be dressed in acute flexion if possible, provided this position does not cause a distortion of the fragments. The posterior moulded plaster-of-Paris splint is probably as satisfactory as any retentive dressing for this condition. The fixation dressing should be kept on for from four to six weeks although this time may be slightly lessened in operative cases where the reduction is good. After removal of the retention dressing the arm should be kept in

a sling for from two to three weeks and the massage and active motion, which should be started in from three to four weeks after the injury, continued during this time.

The rare fractures of the capitellum and trochlea can be treated in general the same as the transverse dicondylar fractures but operative reduction or removal of the fragments must always be considered.

To sum up this subject of fractures of the lower end of the humerus the following points should be reemphasized:

1. Accurate knowledge of the anatomy of the parts is essential.
2. The diagnosis should be made by the clin-

ical findings plus the radiograph taken in at least two planes.

3. Reduction of the fragments should be accomplished conservatively if possible but open operation is necessary if proper alignment is not obtained.

4. Fixation should always be with the elbow joint in acute flexion if possible, not only for the purpose of retention of the fragments but also to give the joint the best possible chance for maximum function.

5. Active motion should be started early with baking and massage when possible. Passive motion has no place in the treatment of these fractures and is absolutely contra-indicated.

FRACTURES OF THE OS CALCIS*

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OF ALL fractures below the astragalo-tibial articulation, fractures of the os calcis are the most disabling.

Not only damage to bone, with resulting change in shape, size and position of the os calcis, but also exostoses, spurs, deformity, damage to joint surfaces with marked and painful limitation of motion of the foot, damage to soft parts, bursæ, nerves and vessels, may individually or collectively be of such serious consequence as to permanently disable the individual from such labor as requires use of or standing on the feet.

Fractures of the os calcis usually come from direct injury, as blows or falls upon the heel. The force is transmitted directly to the os calcis, which, as a result of the sudden and severe external force, may be compressed, shattered, comminuted, or split in two or more pieces, with the extra complication of having the fracture compound.

Again, there may be no evidence of fracture in the os calcis but a decided change in the shape and position of the astragalo-calcaneal and the calcaneal-cuboid joints.

Avulsion of the heel, or os calcis, comes from a shearing force in which the portion of the os calcis is fractured or cut off, and is rarely associated with change in the surrounding joints.

Because of the unusual joint changes associated with fracture of the os calcis, it is well to remember the motion of the various joints of the foot. The astragalo-tibial has only the motion of flexion and extension. The calcaneo-astragaloid joint permits principally side to side motion and a slight gliding of the os calcis backward and forward on the astragalus. The astragalo-scaphoid joint is an arthrodial joint with considerable mobility in all directions. The calcaneal-cuboid joint permits only a slight gliding motion.

We must bear in mind that all motion of rotation of the foot is accompanied by the subas-

tragaral joints, and these are the joints that are most frequently injured by fractures of the os calcis.

It has been my observation that greater disability in fractures of the os calcis comes from damage to joints in change of shape and position than from actual change in shape and size of the os calcis, although pain and disability may be suffered because of exostosis on the plantar surface of the os calcis and because of actual widening of the os calcis by compression with continued pressure on the external peroneal nerves and vessels.

The orthopedic surgeon treats the acute fracture rarely in comparison to the number of times he treats end-results, and it is my opinion, while a certain disability from this serious type of injury cannot always be prevented, a better prognosis could be given if the usual measures of treatment now in vogue were faithfully carried out, and as an end-result, instead of 30 to 50 per cent disability of function of the foot, the final disability could be reduced by at least half of that estimate.

I support this theory because of the frequent history given in the disabled case. We frequently find that there has been an absence of x-ray examination. This fracture is often treated as a sprained ankle with simple bandaging. Again, a short inefficient plaster or splint has been worn for a short period with no efficient after-care and the real diagnosis made weeks after the injury because of the continued disability. These points stand out clearly as the definite causes of disability in this type of fracture.

Treatment of os calcis fracture can be considered only after a suitable x-ray examination has been made. For successful treatment it is necessary to know the type of damage, that is: is the fracture compressed or comminuted; is it a linear fracture, single or multiple, complete or incomplete; or is it a simple impaction between the astragalus and os calcis?

In every case anesthesia is necessary, if manipulation is to be considered. In all cases impaction between the astragalus and os calcis

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must be broken up so that lateral motion of the foot is free.

A compressed type of fracture requires molding and manipulation of the os calcis into its former shape, and usually is accomplished by the use of a mallet or a Thomas wrench, applying the force directly to the os calcis, which has been covered and protected by felt padding. A large engineer's wrench, in the absence of a Thomas wrench, will accomplish the desired end-result by first rocking the os calcis loose, then applying great power to both sides of the os calcis until a suitable contour is obtained. The carpenter's mallet will accomplish the same results, but the force used is less certain and less reliable.

After manipulation of the os calcis the foot is held in slight inversion, slightly below a right angle, with the arch well restored, and a plaster dressing is applied from the base of the toes well above the knee joint, with the knee flexed at a right angle so that all pull of the tendo Achilles has disappeared. The cast is cut on both sides and remains intact for some two weeks, when after-treatment is begun.

Transverse fractures, linear fractures with separation, require, first, a breaking up of all impaction with pulling and retaining of the fragments in place. The Thomas wrench is very useful in breaking up the impaction; the ice tongs or ice pick or Steinman pin is inserted just above the os calcis, anterior to the tendo achillis, and sufficient force is used to pull the fragments in place. The pin, or ice pick, may be incorporated into the plaster dressing and left in place for the first two or three weeks. It may be occasionally necessary to lengthen the tendo achillis in this type of fracture, but flexion of the knee to a right angle, in the greater number of instances, relaxes the tendo achillis sufficiently, with the holding of the foot in slight equinus, so that it is unnecessary to lengthen the tendon. It is necessary, again, to be sure that the conformation of the heel has been restored, the

arch restored, and the foot held in very slight equinus and inversion. It is not infrequent that both compression and linear fractures are present, and in this type of case both remodeling and traction, to reduce the fracture, are necessary.

After-treatment: The foot is held at rest for approximately two weeks in a bivalved cast. At the end of this time the cast is removed daily for baking, massage and gentle motion. This continues for at least four or five weeks, with no weight-bearing, for approximately eight weeks from the time of injury. At this time the wedged shoe, or the shoe with a side-iron brace, is used for support, with a fairly heavy arch in the shoe composed of felt, leather or sponge rubber. The side-iron brace is of great value when weight-bearing is first begun, as it prevents the lateral motion of the foot and the individual may return to work many weeks earlier when this type of support is used.

It is my opinion that in the average case, and under average surroundings, these rather simpler procedures should be advised at first. If, however, there is a question, after suitable x-ray pictures have been made, as to the complete restoration of the os calcis, either in recent or old fractures, because of the attending disability, subastragalar arthrodesis should be advised.

Subastragalar arthrodesis has in the past been used in the older type of case. However, because of the reduction of disability as the end-result, giving a stable, painless foot, the operation should be advised much more frequently.

The Cotton operation, for the removal of the distorted compressed portion of the os calcis, when it presses against the external malleolus, can easily be done at the same time, if necessary; and if operation is to be advised in these cases, I feel that the operation of subastragalar arthrodesis will reduce disability and give a foot that is painless with some limitation of motion, but permit the individual to return to his former occupation in the greater number of instances.

CAUSES OF DELAYED UNION OF BONES*

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IN THIS age of rapid transportation, increasing industrialization of the country and the employment of so much machinery on farms, fractures are becoming more common, and physicians in general practice are called on more and more to take care of fractures of all kinds, many of which are of the severe type previously seen only in the larger industrial centers.

When a fracture is delayed in uniting, much concern is caused to the patient, his friends, and not least to the surgeon in charge. Therefore, a brief discussion of this condition is in order in a symposium of this type. The causes may be divided into two types: systemic and local.

SYSTEMIC CAUSES

Usually delayed union is seen in rugged, healthy men in the active period of life, and in the most careful examination it is rare that any abnormality of a general character is found. Syphilis is often mentioned as a cause of delayed union, but in my experience there have been only two cases in which I thought syphilis might have something to do with delayed union. Not infrequently multiple fractures (oftentimes as many as thirty or forty) in cases of fragilitas osseum in sickly, fragile children with blue sclerotics heal rapidly, in a shorter time than would be expected in a normal person. Of recent years the theory has been advanced, chiefly by Petersen of Johns Hopkins Hospital, that the calcium content and phosphorus content of the blood are concerned with the causes of delayed union and nonunion. Following the work of Howland and Kramer on rickets, Petersen took into consideration the amount of phosphorus and calcium in the blood of patients with fractures. In rickets Howland and Kramer showed that if the product of calcium and phosphorus, obtained by multiplying the number of milligrams of calcium by the number of milligrams of phosphorus in 100 c.c. of blood, fell below 30, the rickets would not heal, and if it rose to above 35, the

rickets would rapidly disappear. The normal calcium content of the blood is estimated at 10 mg. for each 100 c.c., and the phosphorus content at 3.5 mg. for each 100 c.c. The product of these two quantities is 35 and is taken as the normal standard. Petersen tried to apply this principle to fractures, claiming that if the product fell below 30, union would not take place, and that if it fell below 35, delayed union might occur. The same tests were carefully carried out in The Mayo Clinic¹ but it was not possible to corroborate these data. Most certainly there was no evidence in the cases of delayed union and nonunion that were examined that the calcium content and phosphorus content of the blood were below normal. Therefore, I believe I may dismiss from the discussion any further consideration of systemic causes.

LOCAL CAUSES

Local causes may be divided into two types, physiologic and mechanical. Physiologic local causes concern the condition of the tissues surrounding the ends of bone at the site of fracture, and their physiologic reaction to trauma. Of 231 cases of delayed union and nonunion reviewed in 1925, I found that 118 followed severe contusing traumatizing injuries, such as a forearm caught in a belt and severely twisted, or a leg run over by a heavy truck. There has been some experimental work carried on comparatively recently that seems to me to have a bearing on this subject, and although the views that I am about to advance are more or less theoretic, to my mind they are interesting and I present them for what they are worth.

It is known that if normal bone is put in an amino-acid solution, such as glycocholic acid, within a comparatively few days as much as 20 per cent of the calcium is withdrawn from the bone. When tissue is injured and slough takes place, and when hemorrhage takes place within the muscles to form a hematoma, absorption of the devitalized tissue and the hematoma occurs. During this process, amino acids are formed, particularly glycocholic acid. Thus, the ends of

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the bone in a fracture, being bathed in this amino-acid fluid, may be decalcified. Of interest, also, has been the work done by Robison and his associates in the Lister Institute in London on the physiology of bone. They reported the presence of an enzyme found in the ossifying cartilage, in growing bone, in the teeth of young animals, and in the kidney. This enzyme, according to these workers, acts on the phosphoric esters of the blood, hydrolyzes them and liberates phosphate ions. These unite with calcium to form calcium phosphate. Schwarz and his co-workers in Germany repeated this work and claimed that this enzyme was inactive in the presence of an acid solution. Therefore, there would be an inhibitory action placed on this enzyme in an acid medium such as would be found at the site of fracture during the absorption of a hematoma or devitalized tissue. We would, therefore, have two factors unfavorable to bone formation: (1) decalcification of the ends of bones due to being bathed in an amino-acid medium, and (2) the tendency of the amino-acid medium to inhibit the action of the enzyme. Furthermore, it is well known that severe traumatizing injuries tend to delay the normal healing and repair of tissues.

Of mechanical causes there are many that might be mentioned. Marked malposition of the fragments with, not infrequently, intervention of muscles between the ends of the bone is perhaps the chief of the local mechanical causes for the presence of delayed union or nonunion. Inadequate fixation is also a prominent factor. The mechanics necessary to control the fragments of bone are generally simple, but it is regrettable that one so often sees an almost total disregard for these simple mechanical principles in the treatment of fractures. Injury to the blood supply is also important. Once delayed union is present, all are deeply concerned, and oftentimes meddlesome inspections are carried out; many consultations are often held and the leg or arm is taken out and moved around to see if motion is present at the site of fracture. It would be far better, when delayed union is known to be present, to put the extremity back at rest and keep it there for four, five or six weeks. In certain situations, particularly where there are two bones, as in the leg and forearm, one bone may unite readily, a little absorption take place in the other bone at the site of fracture so that

there is shortening, and the united bone then acts as a pivot around which swing the fragments of the other. This, I am convinced, is not infrequently the cause of nonunion of the tibia and the radius. The use of metal is sometimes charged with being the cause of delayed union or nonunion. It is quite likely that the presence of metal has a slightly inhibitory action on the physiologic repair of bone, but I believe the metal is to be blamed only if the mechanics governing the operation are poor. Although it is better not to use metal in the treatment of fractures, under certain conditions it should be used and when properly used it has little if anything to do with delayed union or nonunion. It must be remembered that there is a definite group of cases wherein it cannot be explained why the fractures do not unite, and in such cases the local physiologic causes that I mentioned may be a factor. At any rate, cases of this type display physiologic inertia and fail to respond until by some means the reparative properties of bone are awakened; this is usually best done by an open operation and the application of a bone graft with the necessary careful regard to technic governing the use of bone grafts.

SUMMARY

The causes of nonunion may be classified as systemic and local.

The systemic causes are rarely of any significance. Attempts to attribute the failure of bones to unite to a disturbed ratio of calcium and phosphorus have not been convincing. Experience with the carrying out of determinations of calcium and phosphorus in cases of delayed union and nonunion indicated that this theory was not sound.

The local causes may be divided into physiologic and mechanical. The physiologic causes mentioned offer an explanation of some of the baffling cases which are occasionally seen. The local mechanical causes are by long odds the most common, and explain the vast majority of the cases of delayed union.

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GLUCO-DEXTRIN NO. 1, GLUCO-DEXTRIN NO. 2 AND GLUCO-DEXTRIN NO. 3 NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that Gluco-Dextrin No. 1, stated to be "Dextrose 45.75 per cent, Dextrin 51.86 per cent, moisture Q. S.," Gluco-Dextrin No. 2, stated to be "Dextrose 39.50 per cent, Dextrin 45.61 per cent, Lactic Acid 12.50 per cent, moisture Q. S.," and Gluco-Dextrin No. 3, stated to be "Dextrose 45.75 per cent, Dextrin 51.86 per cent, Potassium Bicarbonate 2 per cent, moisture Q. S.," are marketed by the West Manufacturing Co. The first is apparently nothing more nor less than glucose U. S. P.; the second and third are apparently the same, with the addition of lactic acid U. S. P. and potassium bicarbonate, respectively. The Council points out that there appears to be no good reason why an official article and mixtures of official article should be marketed under these proprietary names. It calls attention to unwarranted claims that are made in the advertising for these products. The Council declared Gluco-Dextrin No. 1, Gluco-Dextrin No. 2 and Gluco-Dextrin No. 3 unacceptable for New and Non-official Remedies because the one is an official article and the others are mixtures of official articles marketed under proprietary names with unwarranted therapeutic claims. (*Jour. A. M. A.*, July 13, 1929, p. 117.)

PHARMACEUTIC PREPARATIONS OF EPHEDRA NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry points out that during recent years much attention has been given to the alkaloid ephedrine and that the free base, ephedrine, and two salts, ephedrine hydrochloride and ephedrine sulphate, have been admitted to New and Non-official Remedies. Further, that the alkaloid ephedrine is one of the alkaloids contained in the drug ephedra (*Ephedra equisetina*, *ma huang*) which contains also an indefinite and variable mixture of bases related to ephedrine but differing quantitatively and possibly qualitatively in their actions. A chemical assay of pharmaceutical preparations of ephedra has, therefore, no value as a measure of their therapeutic potency, having no bearing on therapeutic activity. The Council holds the use of unstandardized preparations of a potent drug to be a step backward, and is distinctly undesirable when standardized preparations (in this case the isolated alkaloid ephedrine and its salts) are practically available. The Council therefore decided that pharmaceutical preparations of ephedra must be considered unacceptable until their therapeutic value in comparison to ephedrine has been established. (*Jour. A. M. A.*, June 22, 1929, p. 2101.)

LOCAL ANESTHESIA IN THE REDUCTION OF FRACTURES*

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LOCAL infiltration anesthesia has been used in the reduction of fractures by many men. It has not, however, come into general use as much as could be desired, and it is for the purpose of demonstrating the value of this method in general practice, as well as in the specialty, that I wish to present this paper.

Conway,² in 1885, was the first to use local infiltration in fractures, and obtained good anesthesia by injecting cocaine into the fracture gap. Since that time, there have been others who have used the method, either by local infiltration of the fracture gap and the surrounding tissues, or by nerve conduction anesthesia. Prominent among these are Fulton,⁴ Frostell,⁵ Cohen,³ Mage,⁷ Muller,⁸ and Farr.⁶

Böhler¹ has probably had more experience in the use of local anesthesia in fractures than anyone in this country or abroad. He has employed local infiltration in over 2,000 fractures. In his clinic, general anesthesia is the unusual procedure. He infiltrates a small quantity of procaine-epinephrin solution directly into the fracture gap, and uses it in all types of fractures.

INDICATIONS

In dealing with fractures, there are at the outset two features of primary importance, which it is desirable to accomplish, namely, the relief of pain and the reduction of the fracture.

If the pain is completely relieved, relaxation of the muscles will follow and reduction of the fracture is very markedly facilitated. The relief of pain may be brought about by the use of opiates, by a general anesthetic, or by a local anesthetic. Opiates will not completely relieve pain; a general anesthetic, though relieving the pain, will not produce complete relaxation of the muscles unless brought to the stage of surgical anesthesia, which is sometimes difficult to attain with the administration of nitrous oxide or ethylene. Relaxation of the muscles is obtained with local anesthesia, and this relaxation may be as complete as under surgical anesthesia.

*From the Department of Surgery of the University of Minnesota. Presented in symposium before Minnesota State Medical Association, May 13, 1929.

No instance of infection following the use of local anesthesia in the reduction of fractures has been reported. No case of delayed healing attributable to this method of anesthesia has ever been recorded. It is evident, however, that this anesthesia should not be used in the presence of infection or in compound fractures.

Charles L. Scudder¹⁰ has said that a fracture should usually be treated as an emergency and reduced immediately. If this procedure is carried out, I believe that the anesthesia will be more effective in producing relaxation of the muscles, for at this time the muscles and surrounding tissue will not usually have become too swollen, and most of the pain will be localized at the site of the fracture. If many hours elapse, or several days, it is evident that the surrounding muscles will become edematous and tender, and anesthesia at the site of the fracture will not produce relaxation. Anesthesia of all painful points, where muscles may have been bruised or their attachments torn, must then be accomplished before relaxation will be complete.

METHODS OF PROCEDURE

In a previous paper, I have described the technique used in infiltrating a fracture of the forearm.⁹

I use a 1 per cent procaine-epinephrin solution. The amount used in any fracture varies from 10 c.c. to 60 c.c., depending upon where the fracture is located. In a Colles' or Pott's fracture, about 10 c.c. should be sufficient. In a fracture of the humerus or dislocation of the shoulder 40 c.c. should be adequate. In a fracture of the hip or femur, 60 c.c. will ordinarily be all that is required.

There is no single point of entry to a given bone or joint, but for convenience and for the sake of decreasing the liability of injury to nerves or blood vessels, I have arbitrarily elected certain points of entrance in each type of fracture or dislocation.

In the wrist or forearm, a dorsal puncture is made over the most superficial portion of the bone, 1 cm. proximal to the fracture gap, from

which the fracture gap and the periosteum over the two dorsal surfaces of the bone are infiltrated; from a lateral or medial puncture, depending upon whether it is the radius or ulna, the periosteum over the ventral surface of the bone is infiltrated.

Circumferential Injection of Radius

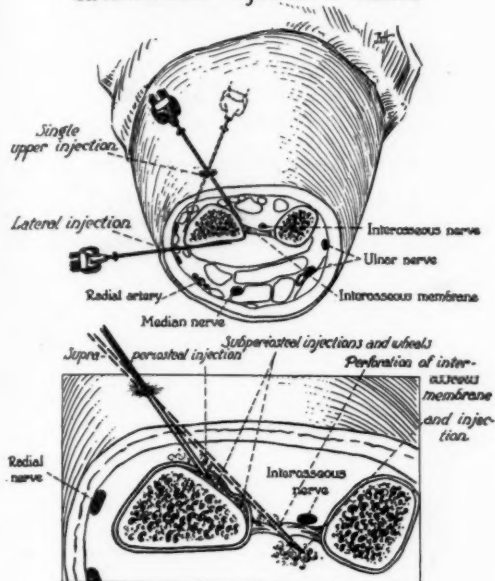


Fig. 1. Infiltration about three sides of the prismatic shaped radius. The insert diagrammatically represents the infiltration of the periosteum.

In a supracondylar fracture of the humerus or femur, a dorsal and a lateral puncture are made, infiltrating the two dorsal surfaces from the dorsal puncture, and the flat ventral surface from the lateral puncture.

For a dislocation of the shoulder, the approach is made through a puncture at the anterior edge of the acromio-clavicular articulation, directing the needle very slightly medially and posteriorly, so as to enter the joint capsule. Tender points, corresponding to the torn attachments of muscles, are also infiltrated if necessary. By using this fixed landmark, the distortion of the shoulder will not lead one to an erroneous infiltration.

By constantly infiltrating ahead of the needle, the pain associated with the process of infiltration is minimized. The needle is projected to the bone, usually over a ridge (Fig. 1), so that from one point two sides can be infiltrated. Since

many bones are triangular on cross section, they can be completely circumscribed from two punctures.

Infiltration is made of the proximal fragment by piercing the periosteum (Fig. 2), and producing several sub-periosteal wheals, in this manner

Injection of fracture gap

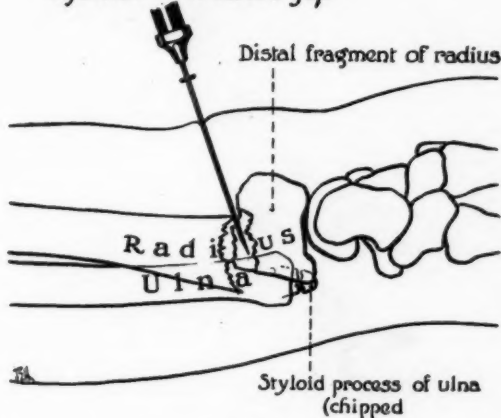


Fig. 2. Infiltration of the fracture gap. The presence of the needle within the fracture gap can be demonstrated by the aspiration of bloody fluid.

circumscribing the entire bone with a wheal of novocaine. The needle is then re-routed without being withdrawn, and directed into the fracture gap, where 5 to 6 c.c. is injected between the fragments. The distal fragment is not infiltrated. Anesthesia and relaxation are complete within 10 minutes after injection. Reduction and manipulation of the fragments can be accomplished painlessly and without undue force.

Whenever a manipulative procedure is necessary for the reduction of a fracture, I believe that this method of anesthesia can be employed to advantage. The fact that there are no untoward effects from this anesthesia makes it especially desirable.

The occasional need for remanipulation of the fragments, directly following reduction, when radiographic control shows inadequate reduction or improper alignment, is also a favorable feature of local anesthesia. Its simplicity and ease of applicability should make it especially favored in general practice. This method of anesthesia may also be used in fractures of the extremities where it is desired to use it merely for the convenience of manipulating a leg without producing pain

during the process of putting a fractured extremity into an apparatus.

I have used this method with complete satisfaction in more than seventy-five cases of fracture of the forearm, in one supracondylar fracture of the humerus, one supracondylar fracture

three fractures of the phalanges, and one fracture of a metacarpal bone.

I recommend that this procedure be used more extensively in the reduction of fractures, for the purpose of alleviating pain and for the purpose of more easily obtaining satisfactory reduction of fractures.

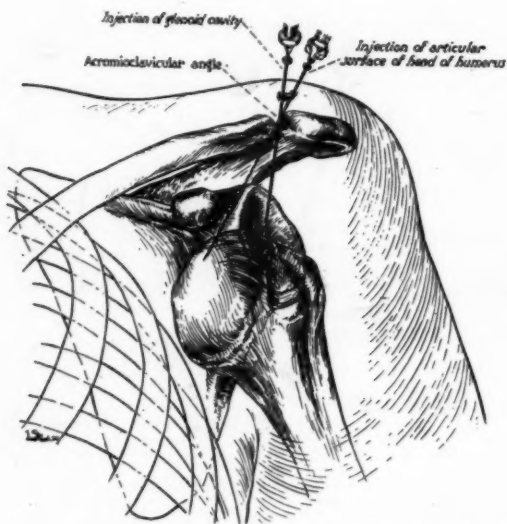


Fig. 3. Infiltration of the joint cavity; the needle is first directed into the glenoid fossa and then without being withdrawn is re-routed and directed to the disarticulated head. The needle is still within the joint capsule.

of the femur, two intracapsular fractures of the femur, four fractures of the leg, one dislocation of the shoulder, four fractures of the clavicle,

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CARDIAC DECOMPENSATION AND ITS TREATMENT*

(Concluded)

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TREATMENT

Rest.—Prolonged, complete rest in bed is the most important therapeutic measure in heart disease. Rest is especially important where fever is present either from an active endocardial lesion or from any other source. Rest should mean not only limitation in motion but also the greatest possible comfort for the patient. A commode at the side of the bed often relieves the patient of a great deal of exertion expended in trying to use the bedpan, which is so hard for some patients. Occasionally one sees a patient with severe orthopnea made uncomfortable by being kept in a horizontal position because it is thought that such a posture involves less strain on the heart. The greater comfort in a semi-recumbent posture with a back-rest more than compensates for the small increase in heart work resulting from a more upright position.

Exercise.—Graduated exercise should be started after the patient has had a sufficiently prolonged rest to help build up the cardiac reserve. The increase in the time of sitting up should be very gradual, in minutes, and later the distance walked should be increased only by a few feet a day. The amount of exercise must always be kept well within the tolerance of the patient. As the condition improves the exercise becomes more and more a therapeutic measure in keeping the musculature of the body as well as of the heart in proper condition. However, all competitive games and all games necessitating violent exertion must be prohibited for all time.

Diet.—The diet should be simple and easy to masticate but not too restricted. Heavy meals should always be avoided so as not to overload the stomach, which may crowd against the heart. Irritating foods and foods that frequently produce gas, such as cabbage and beans, should be restricted. When edema is present, fluids should be limited to from 600 to 1,000 c.c. daily, depending on the condition of the patient. Salt should

be reduced to a minimum when edema is present. Meat need not be restricted too greatly in the diet even in cases of essential hypertension. Spinach and other iron-containing vegetables are good, especially in cases with anemia.

Symptomatic Treatment.—Dyspnea. In severe dyspnea with cyanosis and distended cervical veins it is well to remove the cardiac load of increased venous pressure by immediate venesection. From 300 to 800 c.c. of blood should be removed. This often affords surprisingly great relief. If there is embarrassment to respiration from hydrothorax, hydropericardium or marked ascites, paracentesis should be performed, care being taken not to remove too much during the first aspiration.

Insomnia.—As far as possible patients should be given opportunity to obtain rest and quiet. The various drugs on the market such as bromides, chloral, allonal, dial, cibalgine, veronal, phanodorn and phenobarbital—the latter especially in hypertension hearts—are all good for this purpose.

Pain and Restlessness.—Patients often wear themselves out tossing about in bed unless they are quieted down. One should not hesitate to use morphine in about 1/6 to 1/4 grain doses, or codeine in 1/2 grain doses, to obtain the proper relaxation. Hyoscine in conjunction with morphine is sometimes valuable in controlling severe cardiac psychoses.

Drug Therapy.—Digitalis. Digitalis deservedly holds first place among the cardiac drugs. No drug that can compete with it has thus far appeared on the market. The chief action of digitalis is that of slowing the heart rate by lessening the conductivity between the auricles and the ventricles through the direct action on the junctional tissues and indirectly through stimulation of the vagus. The effect of digitalis on the heart may be summed up as follows:

1. The heart contracts more fully, resulting in a more complete emptying of the chambers.
2. The systolic contraction is more rapid.

*The first part of this paper was published in the August, 1920, issue of Minnesota Medicine, pp. 487-495.

3. Diastolic phase is prolonged with a better diastolic dilatation.

Digitalis should be given in all forms of congestive failure. The best response is obtained in auricular fibrillation when the rate is markedly slowed and the minute volume output increased. The normal rhythm however is not restored through digitalis. Digitalis improves the heart action in enlarged hearts even with slow regular rhythm. It has been shown that asphyxia and increased acidity sensitizes the heart muscle fibers to the digitalis effect, and cardiac hypertrophy and exhaustion favor the increase in acidity as well as asphyxia. There may be improvement in the systolic contraction even if the rate is not slowed down through its use, and the presence of a slow regular rhythm is no criterion that the heart action may not be improved. In the terminal stages of decompensation there is often no beneficial effect because the heart has no reserve force left to mobilize. In all valvular lesions digitalis is indicated but its effect is less pronounced in aortic regurgitation. It is of little value in adhesive pericarditis or luetic mesoaortitis and is often dangerous in cases of toxic myocardium or true myocarditis. The indications for digitalis therapy may be summarized as follows:

1. Cardiac decompensation with auricular fibrillation.
2. Cardiac decompensation with hypertrophy associated with regular rhythm, rapid or slow.
3. Auricular fibrillation with or without decompensation.
4. Valvular heart disease with signs of failure, irrespective of valves affected.
5. In complete heart block, improves the coronary circulation and may increase the heart rate. In other conduction disturbances it should be given with caution or not at all.
6. In auricular flutter it is of value to change the flutter to a fibrillation and then to slow the rate.

If the heart is not entirely decompensated and can still mobilize some reserve force, the circulation will greatly improve through its use and the heart will compensate. The symptoms noted above will disappear and the edema and anasarca will gradually clear up through the diuretic action of the drug. Digitalis induces diuresis only in the presence of edema. Its direct action on the kidneys is slight, the diuretic effect being

principally caused through the improved circulation which brings to the kidneys a greater quantity of better oxygenated blood. If after several weeks of careful treatment no definite improvement is discernible, the prognosis becomes more grave.

Dosage.—Digitalis is generally given in altogether too small doses to have any definite physiological effect, but occasionally, though rarely, is it given also in too large doses. The Eggleston dose should be given only with the greatest caution. It is well to administer the digitalis as a tincture by mouth, the initial dose being about 4 c.c., and giving 2 c.c. every four to six hours until one-half the Eggleston dose (one-seventh of the pound body weight in c.c.) is given. Following this from one to 4 c.c. daily may be given until the heart is digitalized and the desired effect is obtained. As a rule the pulse drops to about 70 per minute. The average subsequent tonic dose is from one to 2 c.c. daily and this can be kept up almost indefinitely, of course always under observation. To begin treatment with 5, 10 or 15 drops t.i.d. is almost useless, since there are about 40 to 50 drops in one c.c. and since the daily destruction and excretion of the drug would be greater than the intake, thus precluding the possibility of proper digitalization. Fifteen drops t.i.d. as a follow-up tonic dose may be sufficient in some cases. The above dosage is indicated only when the patient has not received the drug just prior to the institution of treatment; otherwise the dosage must be modified by making the necessary allowances for previous administration. The amount of the drug destroyed and excreted varies with the individual and with the quantity given.

Some decompensated patients develop anorexia, nausea and vomiting from the congestion in the gastrointestinal tract. These patients cannot tolerate digitalis by mouth for this reason. Such cases should receive the drug in about the same daily dosage but administered in 50 to 100 c.c. of water or normal saline by rectum as retention enema. Instead of giving the daily amount divided into three or four doses as by the oral route, it may be given in only one or two doses. The results from rectal administration are excellent and I consider it superior to the oral route as far as results are concerned. Hypodermic or intramuscular injections should be given only

when the other two routes are not advisable or possible, and the intravenous administration should be resorted to only in cases when an immediate effect is absolutely indicated. One must always bear in mind the cumulative effect of the drug, since its effect remains for a period of from eight to fourteen days following administration. Some patients are hypersensitive and develop toxic symptoms early. These symptoms are nausea and vomiting, oliguria, bigemini, polygemini, disturbances of conduction, ventricular tachycardia and pulsus alternans. A negative T wave in a previously normal electrocardiogram is evidence that the heart has been digitalized. Nausea and vomiting, oliguria, extra systoles and pulsus bigemini are signals of toxic effect of the drug and indicate that the drug should be temporarily discontinued. Ventricular tachycardia and pulsus alternans are evidences of more serious toxic manifestations.

2. *Quinidin*.—The place of quinidin in the treatment of heart disease still remains unsettled, as is evidenced by the enormous literature both pro and con that has grown up around it. The experience of many observers, however, indicates that quinidin has been a most valuable addition to the drug therapy of heart disease. Its value lies almost wholly in the treatment of auricular fibrillation and to a much less extent in the paroxysmal tachycardia. It is most effective in early fibrillation but is also valuable in many of the chronic forms. Statistics show that from 50 to 75 per cent of cases of fibrillation can be restored to normal rhythm through the use of this drug. Unfortunately the restoration is not permanent in all cases but a normal rhythm for from three months to several years can be obtained in a large number. Studies have shown that the velocity of the blood in a normal individual is about twice the velocity in one suffering from fibrillation and that in the latter, after normal rhythm has been restored, there is a definite increase in the velocity.

Beneficial results with quinidin therapy are thought to be brought about through its depressant toxic effect on the heart muscle and through the lengthening of the refractory period. Strongly toxic doses may induce ventricular fibrillation. The dangers associated with this drug are embolic phenomena and the depressant toxic effect on the myocardium which may result in sudden

cardiac failure. However, the dangers of embolic phenomena are greatly overrated and careful observers find that embolic accidents are not more frequent with quinidin than in cases treated with digitalis. To me it appears that the dangers from emboli are greater in the non-treated cases since fibrillation as previously mentioned predisposes to auricular thrombosis even in compensated hearts. A compensated case with auricular fibrillation is therefore just as predisposed to the development of emboli as any decompensated case would be. It is obvious therefore that not to restore a compensated case to normal rhythm whenever that is possible not only leaves the circulation in a less efficient condition but also exposes the patient unnecessarily to the dangers of developing auricular thromboses and subsequently to embolic accidents.

There are certain contraindications to the use of quinidin. It should never be given while the patient is decompensated. The patient should always be previously digitalized. Cases with complete heart block with fibrillation and severe myocardial damage should not receive the drug. I generally continue the administration of a tonic dose of digitalis while giving the course of quinidin treatment. Some object to this method because the digitalis has an antagonistic effect to this drug. However, my experience seems to indicate that the results are better through the combined treatment.

Before instituting quinidin treatment an initial dose of the drug, 3 gr. (.2 gm.) in capsules, should be given to test out the patient for hypersensitiveness or idiosyncrasy to the drug. The treatment consists of administering increased amounts of the drug daily, adding about 6 gr. (.4 gm.) each day until a total of 60 gr. (4 gm.) or more is reached. As much as 200 (13.3 gm.) to 300 gr. (20 gm.) have been given in divided doses of 6 to 12 gr. to the dose, the size depending on the total dose in the twenty-four hours. For example, 42 gr. (2.8 gm.) may be given, 6 gr. (.4 gm.) every hour for five doses, then every two hours for two more doses. The doses must be given in rapid succession because the drug is rapidly excreted, generally in three to five hours. The patient must be carefully watched throughout the entire treatment for toxic effects. Some of the disagreeable symptoms from quinidin administration are vertigo, tinnitus, headache, nau-

sea, vomiting, nervousness and tachycardia. If the symptoms become severe the drug must be discontinued. A normal rhythm may be established with a dosage as mild as 6 to 12 gr. In most cases, however, 35 to 50 gr. in twenty-four hours are required. In some cases no amount of the drug would re-establish the normal rhythm. As soon as the normal rhythm is established a supporting dose of from 3 to 5 gr. t.i.d. is given to prevent if possible the reversion to fibrillation. The course of treatment may be repeated as often as is necessary, should fibrillation reappear.

3. *Strophanthus*.—This drug has been made very popular in France by Vaquez under the name of Oubain. Vaquez claims that it is the heart medicine "par excellence." In this country it is used very infrequently. Its action is similar to that of digitalis. It is given by mouth in doses of 2 to 3 mg. of strophanthin (Oubain) or 2 to 3 c.c. of 1:1000 solution. If an immediate effect is wanted the drug is given intravenously in doses of 1/240 gr. In such circumstances its action seems to be much superior to that of digitalis.

4. *Novasurol*, *Salyrgan*.—These drugs are preparations of mercury which have a profound diuretic effect. The more recent drug Salyrgan is a little less toxic, and just as effectual, as Novasurol. The diuretic effects are most striking when it is given in conjunction with ammonium chloride or ammonium nitrate. The latter drugs are given by mouth in doses of 75 to 100 gr. (5 to 6.6 gm.) daily for a period of five to seven days. During this administration the Salyrgan or Novasurol is injected hypodermically in doses of from 1 to 1.5 c.c. repeated in two or three days if needed. Like other mercury compounds, these drugs are more or less toxic to the kidney parenchyma. The urine has to be watched carefully for evidences of kidney damage such as granular casts and red blood cells. The presence of albumin alone is no contraindication. The urinary excretion is often increased to from 4,000 to 6,000 c.c. in twenty-four hours. The beneficial effect of mercury in cardiac edemas has been known for a long time, as is evidenced by the old favorite pills of digitalis, mercury and squills in the treatment of persistent cardiac dropsy.

5. *Iodides*.—Sodium and potassium iodides are of value in leutic meso-aortitis with or with-

out decompensation. In hypertension and atherosclerotic types the benefits are very questionable.

6. *Caffein*.—Caffein sodium benzoate, gr. 3 (.2 gm.) and strychnin sulphate, gr. 1/20 (.003 gm.) given hypodermically are often of value as cardiac stimulants. The caffein has a diuretic effect and also causes a mild vasodilatation of the coronary arteries.

7. *Diuretin*, *Theocalcin*.—Diuretin or theobromin sodium salicylate and theocalcin or theobromin calcium salicylate are valuable diuretics in doses of 7.5 to 10 gr. (.5 to .67 gm.) t.i.d.

8. *Theocin* is synthetic theophyllin or tea alkaloid. Its indications and doses are the same as Diuretin. It is perhaps a little more effectual as a coronary vasodilator and is indicated in cases of coronary disease.

9. *Euphyllin*.—This is a valuable coronary vasodilator, most effective of all those thus far produced. It is the drug of choice in cases of coronary disease with or without angina pectoris. It is given dissolved in water in doses of 1.5 gr. (.1 gm.) four to five times daily. A few patients are sensitive to this drug.

10. *Nitrites*.—The nitrites lower blood pressure. Amyl nitrite when inhaled lowers the blood pressure very rapidly and is therefore indicated in the treatment of an attack of angina pectoris. Nitroglycerin and erythrol tetranitrate have similar though slower and more lasting effects. Nitroglycerin tablets of 1/100 gr. are used and are most effective when placed under the tongue.

SUMMARY AND CONCLUSIONS

1. Heart disease presents one of the most important problems confronting the medical profession today.

2. Heart failure signifies a condition of disturbed blood distribution with an accumulation of blood under increased pressure on the venous side and a corresponding deficiency on the arterial side.

3. Heart disease may result from certain physicochemical changes in the heart muscle that are not demonstrable anatomically.

4. Impairment of tonicity leads to cardiac dilatation.

5. In a general way, the heart enlarges at the expense of the cardiac reserve.

6. Normal hearts do not enlarge, no matter how great the strain.

7. When the cardiac outline is within normal limits, one must be exceedingly careful in diagnosing serious heart disease.

8. Impairment of contractility may lead to congestive heart failure or to angina pectoris. Pulsus alternans is one of its important signs.

9. Precordial pain on exertion signifies that the heart has reached the limit of its capacity.

10. Heart failure may result from (1) myocardial disease, (2) valvular disease, (3) disorders of rhythm.

11. Myocardial disease contributes by far the greatest number of cases of heart failure and essential hypertension with or without coronary disease is its principal etiological factor.

12. In essential hypertension, the rest force (work of the heart at rest) is materially increased.

13. Hyperthyroidism may produce severe myocardial damage through demand for increased work and through direct toxic degenerative lesions in the myocardium.

14. Rheumatic fever is the greatest etiological factor of valvular disease; the mitral valves are the ones most frequently involved.

15. Unimportant mitral and pulmonic systolic murmurs contribute greatly to the errors in the diagnosis of heart disease.

16. One must not make a stethoscopic diagnosis of heart failure; the stethoscope reveals practically no information relative to the efficiency of heart action.

17. Cardiac decompensation with edema and albuminuria resulting from essential hypertension is frequently diagnosed as nephritis.

18. An enlargement in the cardiac outline is the most important evidence that the heart is mobilizing its reserve force and is on its way to heart failure.

19. Myocarditis is a very rare condition, and the use of the term is much too frequent.

20. Auricular thrombosis occurs in auricular fibrillation even without decompensation. From the standpoint of embolism alone it is just as important to establish a normal rhythm as it is to treat decompensation.

21. Rest and comfort of the patient are the most important factors in the treatment of heart disease. *Prolonged* rest is very essential.

22. Of the cardiac drugs, digitalis holds first place. Proper dosage of this drug often brings brilliant results.

23. Digitalis is usually administered in altogether too small doses.

24. Quinidin is very valuable in the treatment of heart disease for restoring auricular fibrillation to a normal rhythm.

25. Venesection is a valuable therapeutic measure in cardiac decompensation, especially in cases with venous engorgement.

26. Paracentesis of large accumulations of fluid in the serous cavities should not be neglected in severe dyspnea.

27. Novasurol and salyrgan are valuable drugs in the treatment of cardiac edemas. Large doses of ammonium chloride or nitrate given simultaneously greatly increase the diuretic effects.

28. Gallop rhythm and pulsus alternans are evidence of severe myocardial damage.

29. A classification of heart disease is here presented which tends to combine etiological factors with clinical and pathological findings.

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THE TREATMENT OF PSYCHIATRIC PATIENTS IN PRIVATE PRACTICE*

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MANY physicians assume that if a patient develops a psychosis the outlook for recovery is so unfavorable that immediate commitment to a state hospital should be secured. In view of this opinion, the communication of Dr. Arthur F. Kilbourne, Superintendent of the State Hospital for the Insane at Rochester, Minnesota, in the report of the State Board of Control for the period ending June 30, 1928, is enlightening:

"Since the opening of the institution July 1, 1879, to the beginning of this last biennium July 1, 1926, 17,073 patients have been admitted. The disposition of these patients on June 30, 1928, was as follows: Now in the institution, 938 or 5.5 per cent; recovered, 3,594 or 21 per cent; improved, 3,775 or 22 per cent; unimproved, 1,004 or 6 per cent; not insane, 74 or .4 per cent; dead, 4,661 or 27.4 per cent; transferred, 2,883 or 16.9 per cent; on parole, 144 or .8 per cent."

The purpose of this paper is to try to present the part that is played by psychiatrists in private practice in treating patients suffering from mental disturbances, and, as a result of this information, bring about better coöperation with physicians in general practice, who usually first come into contact with these cases and the problems they present.

The following statistics will prove of interest and will startle those who are not in intimate touch with the question of mental disease.

The summary of the Hospital Census of the American Medical Association for 1928 shows the present provision for patients in various types of hospitals in the United States.

This report shows that the total number of nervous and mental patients in the United States, 369,035, is 52.5 per cent of the entire number of patients in all types of hospitals combined.

During the year 1928 there had been a decrease of ten in the number of nervous and mental hospitals since the report of the previous year

but an increase of 20,904 in the bed capacity and an increase of 19,368 in the number of patients under treatment. "Included under this head are the large state insane hospitals, neuropsychiatric research and teaching institutions, the private nervous and mental hospitals, hospitals for the feeble minded and epileptic, schools for backward and mentally defective children, and institutions for the treatment of drug and alcoholic addicts. The incidence of mental disease seems to be fairly uniform for all localities, one person in each 325 being in some kind of nervous and mental institution."²

Mr. Frederick W. Brown, Director of the Department of Information and Statistics for The National Committee for Mental Hygiene, has given some information that is of interest concerning patients in hospitals for mental disease in the United States as contained in the report of the Federal Census Bureau for the year ending January 1, 1923, which are the most recent detailed figures available.

Condition on discharge was reported by all but twelve hospitals, making the total number of discharged patients, whose condition on discharge was reported, 51,304. Of these 29,799 were males and 21,505 females. Also 11,935 or 23.3 per cent were discharged as recovered; 23,683 or 46.2 per cent as improved; 9,796 or 19.1 per cent as unimproved; 4,943 or 9.6 per cent as without psychosis; and 947 or 1.8 per cent as undetermined.

The general recovery rate per 100 admissions for the whole United States was 13.6, the rate for the males being 12.5 and for the females 15.1. The rate of discharge as improved was 27 for all patients; 26.2 for males; and 28 for females. The report states that, "The higher recovery and improvement rate among females is due principally to the excess of females in the manic-depressive group, which yields a high percentage of recoveries, and to the excess of males in the general paralysis group, which yields practically no recoveries."

*Presented before the annual meeting of the Minnesota State Medical Association, St. Paul, May 13 to 15, 1929.

AVERAGE NUMBER OF PATIENTS IN HOSPITALS ACCORDING TO TYPE OF SERVICE

Type of Hospital	Number of Hospitals 1928	Number of Beds 1928	Average Percentage of Beds Occupied 1927*	Average No. of Patients (Not including New-born) 1928
General	4,361	363,337	66.0	239,802
Nervous and Mental	553	394,268	93.6	369,035
Tuberculosis	508	62,113	80.3	49,877
Maternity	164	5,912	64.2	3,795
Emergency (industrial)	169	7,290	52.7	3,842
Convalescent and rest	171	7,347	68.6	5,040
Isolation	92	8,479	36.6	3,103
Children's	65	5,669	69.0	3,912
Eye, ear, nose and throat	77	2,879	53.0	1,526
Orthopedic	64	5,713	79.6	4,547
Skin and cancer	15	1,012	64.3	651
All other hospitals	84	6,084	86.4	5,256
Hospital departments of institutions	529	22,831	56.8	12,968
Totals	6,852	892,934	78.7	702,738

*Results in the column at the right are obtained by applying the percentages to the number of beds given in the column at the left. It is assumed that the average percentage of beds occupied in 1928 would be the same as in 1927, since that percentage varies little (less than 1) from one year to another.

Thus, in the hospitals on January 1, 1923, there were 267,617 patients, of which total 9,231 were in private hospitals or 3.4 per cent. Of the patients admitted during 1922, 15,678 of the 89,455 or 17 per cent were admitted to private hospitals; of the 52,777 patients discharged during 1922, 13,105 or 24 per cent were in private hospitals, and of the patients who died during 1922, 1,393 of the 25,656 or 5.4 per cent died in private hospitals.

A detail of this report shows that on January 1, 1923, there were in the State Hospitals of Minnesota, 7,245 patients, while only 59 patients were receiving treatment in private hospitals for mental disease in our state, but this did not include mental cases in general hospitals and this number would therefore be increased somewhat, especially because of the relatively large number in one general hospital which will be referred to later. These figures are probably approximately correct today, as the last report shows that there had been an increase in the state hospital population of 299 since January 1, 1923, and the increase in the number in private hospi-

tals is probably only proportionate to the increased number in the state hospitals since that time.

The data previously referred to has dealt with the definitely psychotic patients but, for the purpose of this paper, there will be included the borderline mental conditions such as the cases of depression without delusions, the psychoneuroses, alcoholism and drug addiction. These patients all ordinarily require hospital care and this may be in either a public or a private hospital. If the case is one of a psychosis particularly, the family physician often advises immediate commitment to a state institution without giving any consideration to treatment in a private hospital. The writer believes firmly that all of these patients should first be admitted to a private hospital if possible for the sake of accurate diagnosis, as otherwise there is danger of non-psychotic patients being committed on account of lack of facilities for proper study. It is of practical importance, also, to the members of the family if symptoms of mental trouble are present to know whether or not the condition is a

DATA FROM REPORT OF FEDERAL CENSUS BUREAU, YEAR ENDING JANUARY 1, 1923

Class of Hospitals	Number of Hospitals	Patients in Hospitals 1-1-23	Patients Admitted during 1922	Patients Discharged during 1922	Patients Who Died during 1922
State	165	229,837	63,808	34,281	21,602
Other Public*	148	28,549	9,969	5,391	2,661
Private	213	9,231	15,678	13,105	1,393
Total	526	267,617	89,455	52,777	25,656

*County, city, and United States Veterans Bureau Hospitals.

psychosis, as we know what a big part inheritance plays in the occurrence of mental disease. Each case requires careful study, as even what appears like a frank psychosis may prove to be another condition, as is shown by the following cases:

Case 1.—Mrs. M. L., 56 years of age, widow, housekeeper, was referred by Dr. J. A. Evert of Glendive, Montana.

The patient was admitted November 6, 1927, with provisional diagnosis of psychosis, type undetermined, later changed to acute lethargic encephalitis. She was accompanied here by a nurse and her son-in-law, from whom the following history was secured. The patient was perfectly well until October 17, when in the afternoon she had an attack of abdominal pain so severe that she told the family that evening she was afraid she would die. The pain ran from region of stomach up into chest. A physician was called that evening and prescribed a diet with free catharsis. She stayed at a hotel during the next two weeks carrying out this treatment and the doctor saw her several times. The patient slept very little during this time, in part because of pain, but mainly because of insomnia. On October 29 she was visited by the son-in-law who accompanied her here, and his wife, and they noticed nothing abnormal mentally. She said she was feeling more comfortable and they need not worry about her, but shortly after their departure she made an attempt to jump out of the window, and was taken to a hospital, where she was seen for the first time the following day by Dr. Evert. The nurse who accompanied her here had been on duty for almost a week and said the patient's abdomen had been tremendously distended but that this was much improved on admission. Bowels had moved well with laxatives and she had eaten liquids but only with urging and had the delusion that she was an intermediary between God and the world. She had voided without difficulty. The patient had required a hypodermic of $\frac{1}{4}$ grain of morphine sulphate and 1/100 grain of hyoscine every four to six hours the previous week to quiet her.

The family history was negative as to nervous or mental breakdowns, but the patient, two daughters and her mother were subject to migraine, and one brother had them very severely. One brother was rather eccentric and had died from a probable carcinoma of the stomach.

Personal and past history was negative.

The patient's condition on admission here was that of great excitement. She was noisy and resistive and spit out her medicines and refused to eat or drink. In fact, she had all the symptoms of an acute functional psychosis which one would, on first impression, consider typical indications for State Hospital care. Her tongue was dry, pulse good, heart sounds and lungs negative. The blood pressure was 140-82. Her temperature on admission was 99.2 axillary and she ran this temperature or a little higher until December 7, when it became normal and remained so thereafter.

Her pulse was in the 80's during this time. Hemoglobin was 80, white blood cell count 20,000, which dropped to 11,100 in two weeks. Urine on admission showed plus one albumin and gave a positive Fehling's test with twelve drops, but was negative otherwise. Fehling's test was positive on four or five occasions the first days in hospital, then this disappeared and the urine was entirely negative at time of discharge. Blood sugar was .148 on admission.

On November 7 it was not possible to examine the patient satisfactorily as she still was very excited and resistive. She chewed constantly as though she had some gum in her mouth and kept repeating the word "corn cob" in a loud voice. She answered no questions, though opened her eyes and looked around in an investigating manner when those about her were quiet. Her abdomen was greatly distended with gas, but no tenderness, rigidity, nor masses were present. Pupils and eye muscles could not be examined satisfactorily, but on ordinary observation eye movements were normal. Deep reflexes in the upper extremities were normal, but could not be determined in the lower extremities because of her resistance. No muscle soreness was present. Neck rigidity was probably absent but could not be tested satisfactorily as she was too resistive.

The condition remained about the same until on November 10 the patient became lethargic and there was a suggestion of ptosis of the left lid. The left pupil was smaller than the right. There was definite nystagmus and a suspicion of eye muscle paralysis. The deep reflexes could not be obtained in the lower extremities and there was definite neck rigidity. Spinal fluid on November 8 was clear, under normal pressure, negative as to cell increase, colloidal gold curve and Wassermann reaction, with one plus Nonne present. Diagnosis was changed to lethargic encephalitis and energetic treatment for encephalitis in the form of sodium salicylate intravenously in increasingly large doses was instituted at once, to which she responded splendidly.

On December 1 the patient was more rational and had been up some. Her general condition was better in every way.

On December 8 she still continued to improve further, but still had a slight headache although this was less marked than it had been previously. On February 1 was discharged in a very normal condition.

On March 12 of this year Dr. Evert was kind enough to send a report of her condition, from which I shall quote: "She is apparently in very good health and has made a very good recovery from her lethargic encephalitis. When I first saw her she was confined in a cell in the county hospital here. She had the same mental confusion as she had when she arrived in St. Paul. Her former doctors, however, were anxious and willing to have her placed in the State Hospital for the Insane. This is no criticism of them but is merely said to show that the patient was mentally unbalanced and in all of their opinions she was an insane woman."

This case illustrates well the value of a general hospital at least in the beginning of acute

psychotic clinical pictures because had there not been the early recognition of the encephalitis and the immediate institution of energetic treatment for this inflammatory brain condition, it is probable this patient would have died and the family history might have had the odium of the mistaken diagnosis of a functional psychosis, because with an overload of work on physicians as so often exists in the State Hospital, the correct diagnosis might easily have been missed.

The following case illustrates a somewhat different type, but one in which the diagnosis is often confused with an acute psychosis because of the symptoms.

Case 2.—Mr. C. C., single, aged 23, a student, was referred by Dr. R. M. Burns.

The patient was first seen in the early part of September, 1927, when he had returned to the hospital about a month following a sinus operation which had been performed for the relief of a very severe frontal headache together with suggestive prepsychotic symptoms had been present for a number of weeks. Instead of these symptoms having been relieved they had become aggravated. His chief complaints now were of frontal headache together with suggestive prepsychotic symptoms consisting of depression, hysterical reactions of laughing and crying without apparent reason and schizophrenic reactions in the form of childish behavior.

His family history was negative except that his mother had died in a State Hospital several years after commitment, so that the family background tended to mislead one in the diagnosis. Neurological examination and eye backgrounds were negative, but about three weeks later the eye backgrounds showed evidence of increased intracranial pressure, so the patient was sent to the hospital. On October 2 a lumbar ventriculogram was taken and the x-ray picture indicated the presence of a lesion in the right central temporo-parietal region which corresponded to the clinical localization, as the deep reflexes in the left lower extremity had now become more active than in the right. The spinal fluid was clear but showed the presence of a large number of cells which at time of examination were considered to be lymphocytes, but which in retrospect we thought might have been the manifestation of a gliomatosis manifesting itself in the spinal fluid, for when patient was operated upon, Dr. Robert Earl found an infiltrating glioma in the suspected area and at postmortem November 23, 1927, practically the whole right cerebrum was found invaded by this tumor.

These two cases are representative of differential diagnostic problems constantly occurring in our contact with so-called acute mental conditions, and it is such cases which have caused us to feel the desirability of handling them, during the beginning period at least, in a general hospi-

tal where all diagnostic aids are within easy reach and complete hospital facilities exist for instituting prompt and efficient treatment, both medical and surgical, according to the indications.

The following case is a good illustration of a large number of mild mental conditions in which, to secure a satisfactory result, far more attention by physicians and nurses is required in the consideration of intimate individual difficulties confronting the patient than can possibly be given in state institutions. The personal mental handling is the most important necessity for their intelligent treatment and recovery. Such selected patients can be treated most satisfactorily in a general hospital as room or ward patients among the other types of patients requiring medical care.

Case 3.—Mr. C. S., age 34, married, a laborer, on admission, May 22, 1927, stated that the previous fall he had found it necessary to move his family and because of shortage of homes he could not procure a suitable house so moved into a "bunk car" which was situated in the train yard. His friends were surprised that he would live here and remarked that his entire family might be killed by some train if it ran off the track. This began to prey on his mind and he lost interest and could not sleep well. He then began to worry constantly about the possibility of having tuberculosis of the lungs. In January on the advice of his local physician he went to a State Hospital as a voluntary patient and stayed there for seven weeks, when he ran away and had been home for six weeks before coming here. He had no delusions or hallucinations but complained mainly of pains in his head. It was apparent that anxiety and depression were his most distressing symptoms. He had a fear of insanity and of death.

Family history: Mother died from gallbladder attack but she was a nervous type and had a tendency to worry. Three brothers are living and well. One brother killed himself at forty years of age during a spell of depression. One brother was accidentally drowned. He has two sisters and they are both inclined to be nervous.

Personal history: He finished the eighth grade at school and then worked on a farm until he was nineteen years of age, after which he worked around at various odd jobs. At twenty-one years he married and for the past ten years has worked as a section hand. He has four children living and well. His wife is in good health.

Past history is not significant except for appendectomy ten years ago during an acute attack.

His general physical, neurological and laboratory examinations were negative. He was admitted to the psychopathic department but after a few days he was transferred to the ward as our observation convinced

us that he could be treated on the general floor safely. After a marked initial improvement he made no further gain, when one day he told us that he had a fear of going home because his local physician had told him when he advised him to go to the State Hospital that unless he did so he might kill his wife and family. Now, when assured that there was no danger of this, he said he thought he could go home and get along all right. In a few days he was discharged with instructions to report to us from time to time, and in a short while returned to full duty and has maintained his family in a normal way ever since.

There may be a difference of opinion as to whether psychiatric patients should be treated in a general hospital or not, but all the neuropsychiatrists on the staff of one of our local general hospitals which has accepted such cases for over twenty years are agreed that thoroughly satisfactory treatment may be given in a general hospital provided, as in this one, a special department is furnished and the treatment of the psychiatric patients is limited to the neuropsychiatric staff. Thoroughly satisfactory treatment includes medical supervision by a psychiatrist, nursing service by those trained in the care of nervous and mental patients, facilities for hydrotherapy, a properly supervised department of occupational therapy and recreation, complete laboratory facilities, modern diet kitchens with facilities for providing special diets, operating rooms available for complications existing or arising during the course of the mental disease, and consultants at hand for an opinion on any problem outside of the psychiatric field.

The hospital referred to has a total capacity of one hundred twenty-five beds, with a department of sixteen specially silenced rooms provided for psychiatric patients. In the past ten years, during which time accurate records have been kept, the following have been treated: Psychoses, 1,854; alcoholics, 313; drug addicts, 57. In recent years a group nursing plan has been in effect in this department, by which graduate nurses especially trained in psychiatric nursing are employed by the hospital and the patient is charged a rate for the room which is only slightly higher than the price of the average room on the general floor and a charge for the nursing service which is a part of what the cost would be for one special nurse. In this way nursing service is available at all times at lower cost than if one graduate nurse went on duty for a twenty hour period, and many of these patients would require two special nurses on twelve hour duty.

Thus the expense is reduced without sacrificing high grade nursing care. As soon as the patient's condition justifies it, he may be moved to a room or ward on the general floor at the same rate charged the general medical or surgical case. This results in shortening the time of the increased expense for special nursing required and also the patient can make his adjustment to the conditions of ordinary life quicker by passing through the transition from the special care in the psychiatric department to the conditions of home life by first meeting those of general hospital life. In this hospital the importance of occupational therapy and diversion both in and out of doors, has been recognized and a full time director has been employed, resulting in the hospital stay being more pleasant and the improvement more rapid. This feature should surely be included by any hospital which aims to give attention to the care of psychiatric patients.

We realize that there are many physicians who have a very definite prejudice against the admission of any psychiatric patients to general hospitals. Nevertheless, these hospitals are constantly admitting, without their knowledge, patients who are in need of psychiatric handling, as is evidenced by suicide or attempted suicide in addition to the accidents that occur through delirium existing in patients not suffering from psychoses. The author firmly believes that a day will come when no general hospital will be considered to be rendering full service that does not provide a suitable department for the treatment of patients with mental symptoms, either as an integral part of itself or through close association with such a hospital. Dr. Peter Bassoe of Chicago, in a recent letter commenting on the crying need for facilities for the care of mental patients in general hospitals, said, "Some of our large hospitals which rather brag of not admitting insane patients have found that they all the time have cases on hand which have developed after admittance. This is especially true of surgical patients."

The following case illustrates how truly mental patients are sometimes admitted to a general hospital without recognition. It is an unusual mental case that comes complaining of what he recognizes as mental symptoms, because to him his ills seem to arise from some entirely different source.

Case 4.—Mr. G. S., aged 44, married, a German

farmer, was admitted to the hospital August 18, 1927, complaining so definitely of stomach symptoms that his physician gave no thought to the possibility of a mental condition existing. Three days later he loosened the screen from his window on the third floor and jumped to the ground with suicidal intent, receiving multiple fractures, including those of the vertebrae. He was then transferred to the psychiatric department, when it was first recognized that the gastric symptoms were merely a part of a delusional condition and then, as so often happens, a friend gave us the additional history that the patient had been nervous and depressed for some time and that one night before coming to the hospital he had gone to a pond in his pasture planning to drown himself. He told his friend later he did not do so because he heard some spirit tell him not to jump in, so he lay down on the bank for several hours and then returned home. The patient made a good recovery after a prolonged stay in bed on account of the nature of his injuries, and on November 24 was discharged. A report from his wife in February, 1928, said that the patient was getting along nicely.

When the patient recovers sufficiently to return home, there sometimes develops in the follow-up procedure danger of the old saying applying, "Too many cooks spoil the broth," unless there is an understanding coöperation existing between the family physician and the psychiatrist. The family must be instructed, of course, to call the family physician immediately if any acute physical condition arises, and sometimes local supervision of some chronic ailment, such as heart disease, is advisable; but the real management of the remaining mental symptoms should still continue in the hands of the psychiatrist who treated the patient during hospitalization. The best coöperation is secured between the family physician and psychiatrist when they consult together if complications, medical or surgical, arise. This coöperation will be greatly improved when students are taught in medical schools more generally the great truth so well stated recently by President Glenn Frank, University of Wisconsin: "When all is said and done, the doctor must treat patients, not parts of patients."

Many medical schools are recognizing this and are now furnishing their students with clinical material either in psychopathic hospitals or in state hospitals in the same manner as in clinics in all other branches. Our own medical school has recently instituted a plan for this purpose which is perhaps best stated in the following extract from a letter dated April 17, 1929, from

Dr. W. L. Patterson, Superintendent of the Fergus Falls State Hospital:

"The plan put into effect by the medical school on the first of January of having the senior medical students go to each of the state hospitals for a period of three weeks' training has proved to be a very satisfactory and worthwhile arrangement, it seems to me. We have had internes here continually since the first of the year. The other state hospitals, Rochester and St. Peter, have also had internes for three weeks' training. They are divided into groups of eight or nine, either two or three men going to one of the state hospitals for a period of three weeks. As long as the material is not available in the Twin Cities this is about as good an arrangement as could be made in order to give the senior medical student a comprehensive view of the mental cases in the mass. By coming in personal contact with them and making their own mental examination they are really getting something that will be of assistance to them if they go into general practice."

Before concluding this paper, the writer wishes to call attention to another matter that deserves consideration and this is that the presence of a psychosis creates usually a family problem and the psychiatrist in private practice should help to solve it. If the family cannot afford treatment in a private hospital, he should advise how commitment can be arranged so that care in a state hospital may be secured and in suitable borderline cases he may suggest that the patient enter a state hospital as a voluntary patient. During the last biennium 212 voluntary patients were admitted to our State Hospitals.³ If the economic condition permits a period of observation and treatment in a private hospital, this, in the opinion of the writer, should always be provided in the hope that a brief stay will result in recovery or in sufficient improvement so that the patient may be treated at home. If a reasonable period of hospital observation and treatment has not resulted in improvement, or if the diagnosis upon admission is that of an unfavorable psychosis, early commitment to a State Hospital should be recommended, although when the patient or family can afford prolonged treatment in a private hospital, this should be encouraged rather than to allow the family struc-

ture to be weakened by transferring to the state a duty they themselves should carry.

Probably two of the greatest problems that a psychiatrist faces in the matter of advice is what to give with reference to the care of the suicidal depressed patient without delusions and of the patient with delusions of persecution.

For the former class, the ideal treatment, of course, is admission to a hospital where they may be cared for in the psychiatric department during the time of marked depression when there always is great danger of some suicidal attempt. They may be transferred into the general part of the hospital when the depression has moderated, although even then the physician feels uneasy, and, in spite of using careful judgment, will occasionally have some patient attempt suicide. However, recovery will be facilitated if the patient is permitted increased liberties and increased opportunities as his condition improves and warrants these concessions and the physician should not be too severely criticized if an accident of this kind does occur occasionally. It is often better to take some chance rather than have the patient feel that he is being watched constantly. If the family cannot afford private treatment, commitment is often not possible unless suicide has actually been attempted. Occasionally such a patient can be persuaded to enter a State Hospital as a voluntary patient.

The second problem is that of the individual with delusions of persecution. This type of individual should have prolonged if not permanent hospitalization because these are the chronic types of psychoses and are also definitely dangerous. It is often difficult to commit these indi-

viduals, also, because of their mental alertness and clever way of convincing others that they actually are receiving unfair treatment. Dr. Arthur H. Ruggles, Superintendent of the Butler Hospital in Providence, Rhode Island, recently wrote me to this effect: "In our part of the country we have had a number of tragedies resulting from the actions of this type of patient, and I am becoming more and more convinced that an individual who still retains persecutory delusions is a dangerous individual to have outside of a hospital."

Modern medicine has in general advanced rapidly in recent years but the treatment of mental disease has not received the recognition that such a big problem deserves. It is hoped that physicians and hospitals will become sufficiently interested in providing every facility for the adequate treatment of those afflicted with mental disease. It is to be hoped that general hospitals will in the near future recognize the importance of providing well organized departments for the treatment of such patients equal to the standard of all other departments. Then and only then can one say that medicine is advancing symmetrically in all its realms.

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CASE REPORTS

RECURRENT FRACTURES OF THE PATELLA*

REPORT OF CASE

W. A. PIPER, M.D.
Mountain Lake, Minnesota

The patient, a female, at present thirty years of age, 5 feet 3 inches in height and weighing 195 pounds, fell and fractured her right patella. She had the so-called "bone doctor" treatment and was not seen by me until six months later. At this time the upper third fragment was drawn up about a distance of 4 inches above the lower fragment. There was no swelling present and the patient had a distinct limp, dragging the limb forward as she walked.

The fracture occurred March 6 and no operation was performed until September 4. A semilunar incision was made, the quadriceps tendon lengthened, the surfaces of the fracture freshened and brought together by the circular method, kangaroo tendon being used and side sutures of chromic catgut. Normal recovery with good union occurred in about six weeks.

In July of the following year while riding in an automobile over some rough roads the patient struck her left knee against a blanket bar and fractured the left patella transversely. A week later a second operation was performed identical with the first operation except that the quadriceps tendon was not lengthened. Primary union with normal function resulted.

Seven weeks following recovery the patient slipped on a wet floor and refractured the same patella, this time in the upper third transversely. Operation was again performed with a normal result.

About nine months later the patient again fractured the same patella. She at first refused operation but after twelve weeks consented. The procedure was the same except that at this operation the quadriceps tendon was lengthened again with a normal result.

Eleven months later she again fell and refractured the same patella. This time she refused operation and I put the limb up in extension with the use of pillows. The fragments were held together by adhesive tape. She made an uneventful recovery after seven weeks and has had no further trouble. She had fractured the left patella four times, of which three were operated upon and the last one treated by taping.

The patient has no stiffness in her knees and has complete function of extension and flexion. Her only difficulty is when she mounts or descends steps and when she attempts to run. There is no noticeable limp

or interference in the least when she walks on level ground.

Summing up the case one might say, "Much ado about nothing." However, the recurrent fractures with normal recoveries and the delayed periods between operations and time of fracture makes the case somewhat unusual. The use of absorbing sutures in preference to drilling and wire sutures has aided considerably in giving the patient such good functional results.

EARLY MOBILIZATION AND DIATHERMIA IN FRACTURE OF THE ELBOW*

REPORT OF TWO CASES

WARNER G. WORKMAN, M.D.
Tracy, Minnesota

I have checked over 75 fractures involving the elbow joint to compare results obtained since we adopted early passive and active motion with diathermia.

Our series is not large enough to again divide it into two groups: first, those with early motion with diathermia, and, second, those with early motion without diathermia.

By the results obtained I do not refer to anatomical reduction for I presume that the anatomical reduction is just as good or just as bad as formerly except that skill in reduction and holding fragments in position improves with experience. The point I am interested in is the functional result and how soon that functional result can be obtained.

I know that with fractures occurring in this location we were not always satisfied with the function and much dissatisfied with the length of time it required to get these people back at work, particularly our railway employees, until we began very early mobilization of the joint and diathermia.

I should not care to have to argue with the man who does not use or believe in the use of diathermia but I know the patients like it. The private patient swears by it and not at it and is willing to pay for it because of the relief it gives him.

The thing I like about it is that it brings the patient to the office at least every other day and gives one an opportunity to exercise the joint.

By early mobilization I mean taking off the splints at the end of ten days and starting motion; and by diathermia I mean double plates for at least forty-five minutes at least every second day, plates the same size and approximately 100 Ma. per square inch.

We have reduced our time of obtaining normal func-

*Presented in symposium before the annual meeting of the Minnesota State Medical Association, Saint Paul, Minn., May 13, 1929.

*Presented in Symposium before the annual meeting of the Minnesota State Medical Meeting, St. Paul, May 13, 1929.



Fig. 2

Fig. 1

Fig. 3

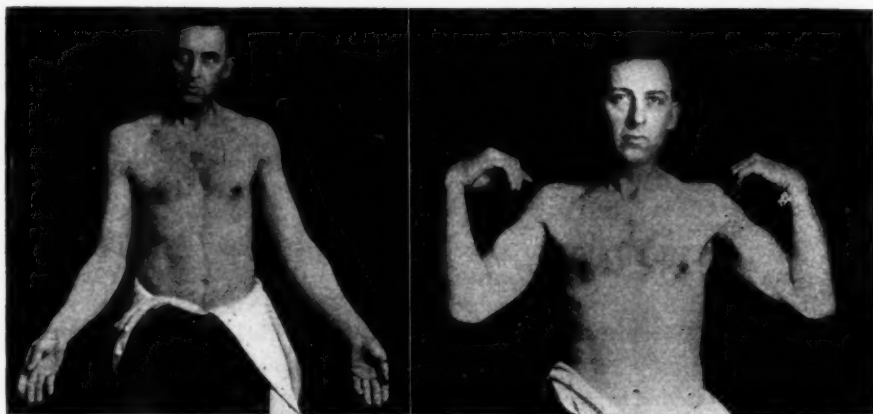


Fig. 4

Fig. 5



Fig. 8

Fig. 9

tion or almost as good function as we are going to get from two weeks to a month by this regime.

I wish to report two cases. The first, a man aged 35, injured from falling from a moving box car, sustained a compound comminuted fracture involving the elbow joint. The first slide shows the fracture before re-

duction; the second, increase of displacement when acutely flexed; the third, after the best reduction which we could get, with callus formation after six weeks. The last two show the final results of extension and flexion at approximately nine weeks.

Figure 6 shows the condition, before reduction, of an

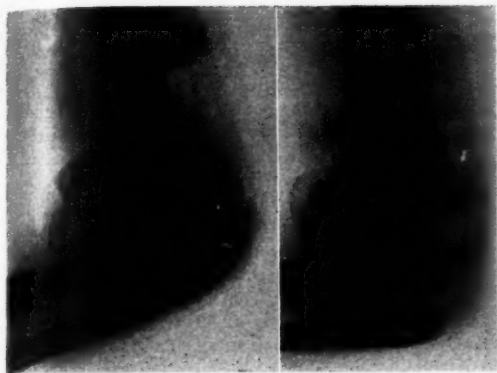


Fig. 6

Fig. 7

elbow fracture in the case of a girl aged 11, injured March 20, 1929, by falling from a hay rack. The position following reduction is shown in Figure 7 and the extension and flexion obtained by May 4, 1929, six and one-half weeks after the fracture, are depicted in Figures 8 and 9, respectively.

INTRACAPSULAR FRACTURE OF THE NECK OF THE FEMUR*

REPORT OF CASE IN A NINETY-THREE YEAR OLD PATIENT
TREATED BY ARTIFICIAL IMPACTION AND WHITMAN
ABDUCTION IN A PLASTER CAST

R. C. WEBB, M.D.
Minneapolis

This case is presented to illustrate this treatment in a very aged person. The Whitman abduction treatment in a plaster case is today agreed to be the proper treatment for this injury. There are many surgeons, however, who agree with this method of treatment, but whose courage fails them when they are confronted with a very old person with a fractured hip.

This old lady, ninety-three years of age, stumbled and fell to the floor on November 23, 1928, and I saw her immediately and placed her in the Asbury Hospital. The x-ray showed an intracapsular fracture of the neck of the left femur with the distal fragment displaced upward about one inch and outward in the usual manner. She appeared very old and very frail and she had a large adenomatous goiter also.

My courage also failed for the time being and I waited four days and then gave her a general anesthetic on a Hawley table and reduced the fracture.

*Presented before the Minneapolis Surgical Society, March 7, 1929.

An x-ray taken immediately with a portable x-ray apparatus showed the fragments in perfect apposition.

A few years ago I saw Dr. Cotton of Boston demonstrate his method of impaction in cases of this type at a fracture meeting in the Cook County Hospital in Chicago and after viewing the x-ray I did an artificial impaction and placed the patient in a plaster cast from the nipple line to the toes with the limb in abduction and internal rotation.

An x-ray film made immediately afterward showed perfect alignment of the fragments in abduction with definite impaction present.

The usual after-care was given, consisting of turning her over on her abdomen for one hour three times daily and raising her in bed, etc. As soon as she recovered from the anesthetic she told us how much more comfortable she was than before being placed in the plaster cast.

Her courage began to fail after one month and she began to eat very poorly and her blood pressure dropped from one hundred thirty systolic to one hundred in a few days. She was given an egg-nog containing a little artificial courage and this was kept up during the next two months and she got along very nicely.

The plaster-of-Paris cast was removed February 26, and an x-ray taken then and compared with previous films showed that the head moved with the shaft and the bones in the same apposition with very slight evidence of absorption.

It is now three and one-half months since the injury. She has survived the usual period of treatment and appears in good condition for a woman of ninety-three years. She will be kept in the hospital a few more weeks and will be supplied with a brace for weight bearing purposes and will probably wear it until August, when she will be ninety-four years of age.

SUBSEQUENT REPORT

This patient was supplied with a walking caliper brace and returned to a home for the aged four months after injury. She was taken outside for daily fresh air and encouraged as much as possible but she gradually failed and died three months after leaving the hospital and seven months and one week after receiving the injury.

Inasmuch as the expectancy of life in a person ninety-three years of age is very low we are left to theorize as to the relation of the treatment to her death. According to the American experience table of mortality for persons ninety-three years of age there were records of seventy-nine persons and of these fifty-eight died during the year, giving a death rate of seven hundred thirty-four per thousand and an average expectancy of nine and one-half months. According to these figures this patient missed her expectancy by two months and one week, which is not excessive on a basis of nearly one hundred years.

DELAYED ACAPNIA AND SHOCK FOLLOWING
RESECTION OF A RIB: REPORT OF A CASE
IN WHICH RELIEF WAS OBTAINED BY
ADMINISTRATION OF DILUTE
CARBON DIOXIDE*

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Section on Anesthesia,
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and

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A girl aged seven years suffered an attack of general malaise, headache, chills, and vomiting, March 2, 1929. A diagnosis was made of pneumonia involving the right side and the patient was admitted to the hospital March 10. General examination and roentgenograms indicated the presence of fluid and March 11, 50 c.c. of clear fluid was obtained by diagnostic aspiration of the right thoracic cavity. Diagnostic pleurocentesis was repeated a week later, when a slight amount of cloudy fluid was aspirated. April 1, another aspiration definitely revealed pus. The cavity was emptied of pus and resection of a rib through the posterior periosteum was done for prolonged drainage. Adequate drainage was obtained and the cavity was irrigated with physiologic solution of sodium chloride. The patient's improvement was progressive. The empyema cavity, which originally had a capacity of 250 c.c., was reduced to a capacity of 30 c.c. in three weeks. The patient continued to have exacerbations of chills, fever, and so forth, after the tube had been removed; this indicated the presence of a residual pocket. It was thought best to unroof this pocket by resection of ribs and this was done May 1. Removal of portions of three ribs was necessary in order completely to unroof the pocket, which contained about 350 c.c. of pus. The patient had considerable reaction following the operation; the temperature was 103° F., the pulse rate was 70 beats a minute and respirations were 67 a minute. On the afternoon of the third postoperative day, respirations had increased to 80 a minute, were shallow, and numerous fine râles were heard over both lungs, particularly at the bases. The patient's color remained good until the afternoon of this day, when it was thought best to begin treatment by the oxygen tent. This treatment was continued for about thirty hours, without noticeable improvement except that the cyanosis disappeared. Congestion of the lungs increased and respirations were shallow.

On the evening of May 4, it was decided that the child needed carbon dioxide. Various methods of sup-

plying her with carbon dioxide were considered. She was very fretful, fearful, and suspicious; it would have been almost impossible, and certainly inhuman, to have forced her to submit to the application of a mask and to inhale carbon dioxide from a bag. Administration of morphine to a point at which accumulation of carbon dioxide in the blood could have been depended on, would have reduced the depth of respirations. This was considered undesirable because of the râles which could be heard over the entire chest. Since, already, she had become better accustomed to the oxygen tent, it seemed advisable to use the tent as a mask, to remove the soda-lime from the apparatus, and to add carbon dioxide to the air in the tent, directly from a tank of pure carbon dioxide. This procedure was carried out and there was noticeable increase in the depth of respiration. The respiratory rate dropped from 80 to 64; then it returned to 78. However, the child immediately became drowsy and less fretful; after four hours in the tent, respirations had been reduced to between 50 and 60 a minute, the pulse rate reduced to 140 and the temperature reduced to about 101°. There was difficulty in handling this small, fretful patient, and the gas was administered at night; therefore, we were prevented from making analysis of the gas in the tent and we do not know exactly the proportion of carbon dioxide that it contained. We do know, however, that at times the patient had a slight cough, and that the amount of carbon dioxide from the cylinder was then reduced from 15 to 10 gallons an hour, and the coughing stopped. The flow of oxygen into the tent was circulated over ice constantly. We believed that the behavior of the patient would be the best guide to the amount of carbon dioxide that should be administered, and that if she received too much she would give evidence of it by complaining of a sense of suffocation, by increased respiratory movement and by coughing.

The depth of respirations increased markedly at times. There was some coughing, which seemed to come only when the flow from the tank was too great. The mixture of gas in the tent was diluted by the air in the tent and by leakage of air into the tent. Therefore, the concentration of carbon dioxide in the tent was not very great. The treatment by means of oxygen and carbon dioxide combined was continued for four hours, when it was decided to take off the tent and allow the patient to breathe air. The patient rested well all night; the respiratory rate remained between 50 and 70. The following day, the rate fell to 45, but it began to increase again in the evening, and shallowness of respiration and signs of pulmonary congestion returned. Oxygen and carbon dioxide were given again, this time for only one and a half hours. There was a greater reduction in rate and increase in depth of respiration, and less tendency to coughing than at the previous time. There was no return of symptoms of acapnia after this period of administration of oxygen and carbon dioxide, and the respiratory rate fell to as low as 40 and never became elevated above 60. The result of administering carbon dioxide to this patient was rather spectacular and most gratifying to all

*Submitted for publication July 19, 1929.

concerned. May 7, the temperature was 101°, the pulse rate 140, the respiratory rate 45, and the patient's condition was greatly improved.

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POISONING FROM METHYL CHLORIDE USED IN DOMESTIC REFRIGERATORS

At the 1929 annual session of the American Medical Association the House of Delegates, recognizing the dangers of toxic gases used in industry and in the home, asked the Board of Trustees to appoint a committee to look into the situation and to advise the medical profession and the public for the good of the public health. In the meantime additional deaths from the use of methyl chloride in mechanical refrigeration have occurred in Chicago as determined by a special coroner's jury, which has recommended the discontinuance of the use of methyl chloride as rapidly as possible, the temporary use of warning gases with methyl chloride until substitution of some less hazardous gas shall be made, and a definite warning by man-

ufacturers to users of such apparatus as to the hazards involved. (*Jour. A. M. A.*, July 27, 1929, p. 288.)

MORE DEATHS FROM THALLIUM

Three more deaths from thallium poisoning are reported. Three boys, aged ten, eleven and twelve years respectively, received successive doses of thallium acetate for ringworm. Although influenza had left one of them apathetic and the other two were mentally dull since birth and all three were undernourished, the dose of 0.008 Gm. per Kg. of body weight was either given or its administration begun. The effort to give the calculated amount in divided doses caused death as have other similar attempts. Only one dose should be given, and for children infirm in any way this should be less than the usual amount. (*Jour. A. M. A.*, July 13, 1929, p. 122.)

PRESIDENT'S LETTER



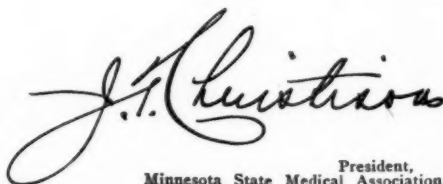
The Storage of X-ray Films

AT this time this is a pertinent subject and should have the serious consideration of the State Association, its component county societies, of groups and of individuals, more especially those conducting x-ray laboratories.

The disaster at Cleveland May 15, last, has brought about a natural desire on the part of those whose duty it is to care for the welfare of our citizens to enact laws or ordinances tending to the prevention of a recurrence of such a calamity.

At the present time it appears that the City of Minneapolis is the only City in Minnesota having an ordinance regulating this matter. It is now proposed to enact regulations much more drastic. On June 24, last, a meeting of representatives of the Fire and Buildings Departments of Duluth, Minneapolis, and St. Paul, was held at the office of the State Industrial Commission, at which measures calculated to insure safety were discussed. A careful perusal of the proposed Minneapolis ordinance leads us to the conclusion that its passage unmodified would work unnecessary and unwarranted hardship upon many of the members of our profession. Dr. E. L. Tuohy, president of the St. Louis County Society, has appointed a committee of which President-Elect Boyer is chairman. This committee have given the subject serious consideration and as a result have offered some valuable suggestions. Doubtless Dr. E. L. Gardner, president of the Hennepin County Society, and Dr. Wallace H. Cole, president of the Ramsey County Society, will appoint like committees. For the State Association the committee on Public Policy and Legislation has the matter in hand.

It is hoped that no hasty action will be taken by any municipality and that due consideration be given the use of safety films and that a reasonable time be given in which to comply with whatever ordinance may ultimately be passed. Consideration should also be given to the passage of a State law at the next meeting of the Legislature.



President,
Minnesota State Medical Association.

EDITORIAL

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X-RAY BURNS OF THE PHYSICIAN'S HANDS

One contemplates the maimed hands of such pioneers in radiology as Holzkecht, Levy-Dorn, and Baetjer—to mention only a few of the martyrs to this medical specialty—with a feeling of pride in their accomplishments and sorrow at their sacrifice. But the contemplation of similar burns on the hands of physicians of this day and age evokes only astonishment at their ignorance and carelessness.

That roentgen dermatitis of the hands is markedly on the increase amongst physicians is

indicated by the large number of serious cases which have been observed this year in Minnesota alone. That these burns are occurring almost exclusively amongst the general practitioners in the smaller communities of the state is significant. It is rare to find any skin changes on the hands of the younger roentgenologists who are, no doubt, utilizing x -rays far more constantly than the average general practitioner.

Roentgen dermatitis, with all its sequelæ of ulceration, warts, epitheliomata, skin grafts, and amputation, is a most crippling disease. When occurring on the hands of a physician it is indeed unfortunate and doubly so because it is entirely preventable. There is a deplorable tendency for the distributors of x -ray apparatus to sell their product to untrained medical men without even a word of warning as to the dangers which lie in the handling of these powerful instruments. The willingness of intelligent physicians to utilize radiation without proper education is even more deplorable. The methods of protection against the injurious effects of radiation are well known, have been described repeatedly and should be carefully read and strictly observed by any one who proposes to use radiation for diagnosis or therapy. The occurrence of burns amongst the pioneer radiologists was excusable because they had to learn from this unhappy experience the deleterious effects of radiation and the methods of protection against them. The absence of burns amongst the younger specialists in this field, in spite of the large amount of roentgenoscopy and radiation therapy which they do, attests to the effectiveness of these methods of protection. The development of an x -ray burn today indicates always a gross error or gross negligence.

The greater number of extensive and severe burns occur as a result of prolonged roentgenoscopy during the reduction of a fracture or removal of a foreign body. The bare hands are used for manipulation and in some cases have been exposed almost continuously for periods of two or three hours, with disastrous results.

The observance of certain simple rules may prevent almost all harmful effects. Only a brief summary of the more important of these can be given here. The x -ray tube used in roentgenoscopy should be at least twenty-five inches from the fluorescent screen and should be completely enclosed by lead or leaded glass. A filter of one millimeter of aluminum should always be in place. The current values of the radiation should not exceed five-milliamperes at a peak voltage of eighty-ninety thousand (approximately a five-inch spark gap). During the examination the lead diaphragms should be adjusted to as small an opening as possible and the current should be interrupted at frequent intervals. Manipulation of the patient during roentgenoscopy should never be done with the bare hands. Lead rubber gloves should be worn whenever possible and, if not, an ordinary leather glove helps considerably. In manipulating a fracture or removing a foreign body the current should be turned on only at infrequent intervals, the manipulation being done chiefly without radiation. In all roentgenoscopy the examiner should never place his hand between the patient and the x -ray tube; it should always be between the patient and the screen. The physician should never hold a patient during therapy or during the exposure of a film. More detailed and exact rules can be found in any standard textbook on radiology. The use of radiation is a dangerous procedure. Its deleterious effects can practically all be prevented by the application of our present knowledge.

LEO G. RIGLER, M.D.

THE AMERICAN PUBLIC HEALTH ASSOCIATION ET AL.

The meeting in Minneapolis, towards the close of the month, of a national society the size and importance of the American Public Health Association merits special editorial attention. The coincidental meetings of some nine other national, regional and state organizations whose concern is the public health, make the week of September 30 to October 5 a red letter week in the local calendar.

The majority of the medical profession are concerned with curative medicine as applied to the individual. Preventive medicine as applied to social groups is in fact the more important and is demanding an increasingly larger share of the profession's time and personnel.

The coming convention will, it is true, be in large part devoted to the preventive phases of medicine, with emphasis placed on education, not only of physicians, nurses and workers in the various activities represented, but education of the public.

Here, at our door, comes the opportunity to acquaint ourselves as physicians with the scope of these various health associations and to broaden our field of knowledge of the specific health agencies, active in our state and country. Health associations should be directed or advised by members of the profession and it behooves us to take advantage of this opportunity to become better acquainted with a number of them.

OUR PERTURBED ORGANIZERS

The writer gets much information and considerable stimulation out of the pages of the American Medical Association Bulletin. There one reads medical oratory at its best and even if denied the opportunity of attendance at some of the various assemblies held under the auspices of the mother house in Chicago, the echoes rise from the pages, of dangers sensed, attacks diverted, and movements won. Those guiding this standardizing machinery deserve our loyal support rather than cynical or lethargic comment. Nevertheless, it can do them no harm to prick a few of their alarm bubbles and possibly direct their zeal to more productive fields.

Recent attendants at the American Medical Association meeting came back none too impressed with the depth, scope, manner of presentation, or novelty of many of the papers heard. Of course, there were the usual noteworthy exceptions. This bold statement is made because of the alarms and fears expressed in the Bulletin and elsewhere that special societies and (particularly) hospital staff meetings are absorbing the doctors' interests and that it is in their

closer circles that the best educational material is being presented.

The fear is unfounded: these societies are the proving ground for developing men. The real trouble lies in the formal machinery—political and otherwise—which absorbs so much of the time and vitality of the American Medical Association and our State Societies. Those who are fearful should subordinate a lot of the pomp and ceremony, and not a little plain bunk, in the big meetings; the small ones are here to stay. They are developing and displaying methods as direct as they are helpful. They come direct to the vital issues of the day and are first to sense them. Little time is lost in official greetings and triumphal entries. Romans like Titus had an arch for their reception, not so much to tickle their vanity as to "pep" up their followers and successors to return to the provinces not only to perpetuate the system, but to garner the provincial bacon.

E. L. TUOHY, M.D.

MISCELLANEOUS

STATE BOARD OF MEDICAL EXAMINERS

INDIAN HERB DOCTOR ARRESTED AND FINED

After an investigation by Mr. Brist on behalf of the State Board of Medical Examiners, Mrs. Mary Jeffery, half-blood Indian, was arrested for violating the Basic Science Law in Le Sueur county; Mrs. Jeffery has been treating people in the vicinity of Belle Plaine and New Prague for the past several months. Large sums of money have been paid for treatment of cancer, diabetes, asthma and other ailments.

Bail was set at \$1,000.00, which was not furnished, and Mrs. Jeffery was taken to the county jail at Le Sueur Center.

On August 9 at Glencoe, Minnesota, Mrs. Jeffery entered a plea of guilty and was fined \$100 and court costs amounting to \$26.90; a jail sentence of 60 days was imposed and suspended on condition that she refrain from selling herbs and roots in this state.

Judge Tift warned the defendant that she must keep out of the healing business entirely.

THE GLOVER HEIGHT-INCREASING FRAUD

Clara Louisa Glover and "Bernard Bernard" (the latter's real name, according to the federal authorities, is Trappschuh) were engaged in exploiting a device for the alleged purpose of increasing the height of those who desired to be taller. Neither Glover nor Trappschuh is a physician. Trappschuh, under the name, "Bernard Bernard," publishes books on sexual subjects and fad diets. The device itself consisted essentially of a halter to be placed about the head of the user which permitted adjustment to a height which would barely enable the user to touch the floor with his feet. After investigating the device and the claims that were made for it the postoffice authorities closed the mails to "L. Glover, Specialist," and "L. Glover" at Sausalito, California. Glover and Trappschuh then transferred their operations from California to Chi-

cago, and advertised the device under the trade name, "Glover Institute." Accordingly the postoffice authorities extended the fraud order to cover the name of the Glover Institute at Chicago. (Jour. A. M. A., July 6, 1929, p. 53.)

CRYSTALLINE PEPSIN

Within a comparatively few months successive announcements of the isolation of crystalline insulin, crystalline tuberculin, crystalline urease and crystalline pepsin have followed one another. This crystalline pepsin possesses all the enzymatic properties: it hydrolyzes gelatin, casein, egg albumin and edestin in acid solution and is rapidly inactivated by alkali or heat. It crystallizes in small prisms. The highest peptic activity thus far secured is about 1:20,000 U. S. P. (Jour. A. M. A., July 27, 1929, p. 285.)

A PAGE FORUM OF THE COMMITTEE ON PUBLIC HEALTH EDUCATION

THIRTY YEARS OF PUBLIC HEALTH

It is thirty years since The American Public Health Association came to Minneapolis. That is the lifetime of a generation, but it covers the days within which many generations come and go—within which much has happened. The American Public Health Association was a small affair in those days. Its program was poorly developed. Its science of health was crude.

Things have come a long way since then. Not only has the parent organization grown greatly. Its offspring of health associations and health agencies has multiplied the country over. Seven National Bodies are coming to Minneapolis in this year of 1929. But even that is far from the whole tale of events.

The consciousness of the American people has wakened widely, in these later days, to the superlative values of human health. It is no longer content to be sick—even though, by grace of Providence and the Doctor, it recovers. It is learning that the price of disease is impaired health; that a man, as well as a machine, is so much the worse for having to go under repairs. It is finding out that the doctors', the nurses' and the hospital bills come high, but that diminished vigor, lessened power capacity, curtailed enjoyment of life come higher still. It wants to be well—wants its children to be well—nay more, wants to know how to grow better and to see them grow better as the years go by. It has heard that disease is preventable and it wants it prevented. It is being taught that human health means the health of the whole piece—that physical welfare, mental welfare, moral welfare, social welfare are all one; that positive physical well-being, mental growth, emotional balance, self-discipline or control, the thoughts a child thinks and the things a child does, at work or at play, all enter into the making of character. All this is part and parcel of health—public, communal, personal health. Hygiene is, after all, but the science of good behavior.

Public health has come a long way toward medicine and medicine is coming a long way toward public health. There is still a long way to come. In these anticipated meetings there is a great opportunity for them to get together. They are *not* one. They will never become one. Each has become too great to be inclusive of the other. But they have much in common. There is a vast deal of knowledge which each may bring to the service of the other. They are in touch at numberless points of professional experience.

Let the whole medical profession of Minnesota come to Minneapolis, for at least a day, to welcome its public health brethren and sisteren, to attend the Northwest Conference for Child Health and Parent Education (for even medical parents have much to learn), to study the Educational Health Exhibit to be put before the people at large; to urge each other along in the pursuit of human health, to help each other to win toward a common goal.

RICHARD OLDING BEARD, M.D.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

AMERICAN PUBLIC HEALTH ASSOCIATION NORTHWEST CONFERENCE FOR CHILD HEALTH AND PARENT EDUCATION

A number of national, regional and state health associations will convene at the Auditorium in Minneapolis towards the close of September.

The Conference of State Sanitary Engineers will begin its sessions at the Curtis Hotel Saturday, September 28. The other members of the group, including the Conference of State Laboratory Directors, will convene Monday, September 30, at the Auditorium.

The third annual session of the Northwest Conference for Child Health and Parent Education will open at the Auditorium Wednesday, October 2, at 9 a. m., and will run for a day and a half, the morning sessions of Wednesday and Thursday, October 2 and 3, and the Wednesday evening meeting to be held jointly with the American Child Health Association.

A Popular Health Program, consisting of health talks, demonstrations, radio, delineascope and lantern slide exhibits is planned for each afternoon from October 1 to 5.

The Educational Health Exhibit, to be presented under the joint auspices of the American Public Health Association and the Northwest Conference for Child Health and Parent Education, for the benefit of the public will be open from Tuesday morning, October 1, until Saturday noon, October 5.

Visitors will be asked to pay a registration fee of one dollar, which will grant admission to all of the sessions of the various association meetings.

AMERICAN COLLEGE OF PHYSICAL THERAPY

The Clinical Congress and eighth annual meeting of the American College of Physical Therapy will be held in Chicago, November 4 to 7, 1929, at the Sherman Hotel.

One half of each day will be devoted to a variety of clinics in the various specialties with joint meetings of all sections for the presentation of numerous addresses of general interest to physicians. Education in physical therapy will be stressed. Duly licensed physicians as well as technicians and assistants, properly sponsored, are invited to attend.

The program and other information may be obtained by writing the Executive Offices, American College of Physical Therapy, Suite 716, 30 North Michigan Avenue, Chicago, Illinois.

WEST CENTRAL MINNESOTA MEDICAL SOCIETY

The annual outing of the West Central Minnesota Medical Society was held July 14, 1929, at Glenwood, Minnesota, Dr. E. A. Eberlin acting as host. The next meeting of the society will be held at Morris, Minnesota, October 9, 1929.

HENNEPIN COUNTY MEDICAL SOCIETY OPENS NEW HOME

On September 26, 27 and 28, Minneapolis physicians of the Hennepin County Medical Society will celebrate the opening of the new Medical Society home on the twentieth floor of the new Medical Arts Building.

The occupying of these commodious and luxurious quarters of the Society, uniquely situated upon the top floor of this beautiful building, will be an epoch event in the history of the Society.

The new home, consisting of a large auditorium, spacious library and reading rooms, committee rooms, kitchen, business office, lounge and open-air terrace, is being fully equipped with everything that will promote the scientific advancement of the membership. The opening program will consist of dedicatory exercises, Friday and Saturday morning clinics by prominent guest clinicians, golf tournament, a Saturday night smoker, and many other events of scientific and social interest.

The membership of the Society is extending a cordial invitation to the physicians of the northwest to participate in this event.

MINNESOTA SURGICAL SOCIETY

Members of the Minnesota Surgical Society will meet in Duluth, Saturday, September 14. Headquarters will be at the Duluth Clinic, 205 West Second Street. Present officers of the society are: President, Dr. M. G. Gillespie, Duluth; secretary, Dr. Daniel H. Bessesen, Minneapolis.

SOUTHERN MINNESOTA MEDICAL ASSOCIATION

At the annual meeting held in June at Winona, Mankato was selected as the meeting place for the 1930 convention of the Southern Minnesota Medical Association, the time to be in September or October, a definite date to be decided later.

Election of officers for the coming year resulted as follows: President, Dr. Waltman Walters, Rochester; first vice president, Dr. J. T. Schlesselman, Mankato; second vice president, Dr. C. B. McKaig, Pine Island; secretary, Dr. M. C. Piper, Rochester.

By resolution members of the Association established a medal for the best scientific exhibit to be shown at the state medical convention or for the best research work done by a medical student at the University of Minnesota.

WISCONSIN STATE MEDICAL ASSOCIATION

The eighty-eighth annual meeting of the Wisconsin State Medical Association will take place at Madison, September 11, 12, and 13, 1929. A three-day scientific program has been announced, the annual dinner the evening of the twelfth to be addressed by Dr. William A. Pusey of Chicago.

Members of the Minnesota State Medical Association have been extended a cordial invitation to attend.

CONSULTATION BUREAU

WM. A. O'BRIEN, M.D., *Director*

Minnesota State Medical Association
11 West Summit Avenue, Saint Paul, Minnesota

1. *Question.*—Farmer, aged 59, negative family history. He has had difficulty in swallowing for the past five years. Food seems to be regurgitated before it reaches the stomach. He has lived largely on liquid food and has lost 70 pounds since the onset of the present illness. No complaints of pain, heartburn, or acid eructations. There is slight tenderness in the epigastrium but no palpable tumor. He was told that there was a kink in his esophagus when first examined five years ago. Patient is nervous, highstrung and wilful. He can swallow coffee but no soup or milk. He is thin and has a lemon yellow color. Urine negative. Blood pressure 120-70. He has improved slightly on bismuth subnitrate, gr. V, Magnesia Gr. X; Blenol and essence of pepsin, Q. S. A. D. dram I. X-ray examination was made of the esophagus and stomach. The plates show a dilated esophagus with a constriction near the diaphragm. The stomach is apparently normal. What diagnosis would you make?

Answer.—The most probable diagnosis of your patient's condition is cardiospasm. Malignancy can be ruled out from the appearance of the film, the duration of the symptoms and the complaints of the patient. The background for cardiospasm is a neurotic constitution. The treatment is dilation of the spasm and correction of neurotic habits. This is usually done by bougies. Secondary malignancy may occur at the constricted portion. A better idea of the condition of the wall may be obtained by having the patient swallow a thick barium paste, and taking the picture shortly afterward. The paste should be held in the patient's mouth until you are ready to make the exposure. Atropine and other antispasmodics may be tried but dilating the spasm by instruments is the best method.

2. *Question.*—Do you consider the La Motte apparatus for doing blood sugar reliable? What is the best single volume for a general practitioner on diseases of the eye? What is your choice for a single volume on diseases of children?

Answer.—The La Motte blood sugar apparatus is a fairly reliable clinical method. It has the advantage of being less complicated than the regular hospital laboratory methods. Any of the simpler types of laboratory apparatus do not give fine distinction but they give the gross differences which are sufficient for clinical work. A good single volume on diseases of the eye is May (\$4.00); or Parson (\$6.00). Diseases of Children: Chapin and Royster (\$7.50), Holt and Howland (\$8.50), or Porter and Carter (\$10.00). The last named book has a great deal of space devoted to therapy.

3. *Question.*—I have a patient with unresolved pneumonia due to Type II infection by bacteriological examination at the time of the onset, April 16. Right lower lobe involvement. Patient was treated with specific serum. At present he shows good general improvement. Temperature varies from normal to 100, pulse 80 to 90. No sweats or chills since the acute stage of illness. Posteriorly, lungs still show physical signs of consolidation. Moist rales indicative of resolution have been present for the past eight weeks, but bronchial breathing and slight dullness still persist. There has been no fluid accumulation at

any time, although aspirations were done to check findings. No x-ray facilities are available. Have thought of possibility of tuberculosis, but no bacilli have been found in the sputum. I would like to do a Mantou test. What are the possible untoward effects in case of reaction, and also what about the reliability of the information to be gained? Patient is a young man, 26 years of age, with a negative past history.

Answer.—The Mantou test is slightly more sensitive than the Von Pirquet test, that is—it may be found in tuberculous infection when a negative test would ordinarily be obtained by the latter method. This test is not advised for your patient because a positive reaction would not mean anything more than tuberculous infection at some time and a negative might be found in the presence of active infection. When a lung fails to resolve, organizing pneumonia, abscess and empyema should be considered. The most helpful thing for you to do would be to get some good x-ray studies. Sometimes an encapsulated empyema (interlobar) will give a history like the one you have presented. The history does not suggest lung abscess. Very frequently the lung signs in pneumonia are very slow in clearing. With physical findings similar to the ones you have presented the x-ray may show practically nothing. The future conduct of your treatment should be based on accurate x-ray studies.

4. *Question.*—Female, patient, aged 23, single, was taken sick in April, 1929, with a para-rectal abscess between the anus and the vagina. This was opened and a fistula resulted, which was operated on about July 15, 1929. Following this the patient was given mineral oil, drams II, twice a day. The result from the fistula operation seems fairly good, although there is still some thin discharge and the patient is quite tender posterior to the anus. We have thought of the possibility of another abscess developing. She has had from three to four stools since the onset of her illness but does not know anything about the character of the stools and does not remember having a true diarrhea. Because of a recent experience with amebic dysentery I examined a fresh warm stool for ameba but did not find any. The patient has never been outside of the state. Can you give me any suggestions as to the cause of the frequent stools? If you think it might be possible that she has amebic dysentery what is the best method of examining the stools? Why should she have repeated para-rectal abscesses?

Answer.—The probable cause of frequent stools is irritation in the rectum and anus, from the neighboring inflammation. The story does not resemble amebic dysentery although more stools should be studied. The best method of finding the organism is to examine the warm stool as you have done. Sometimes a little blood streaked mucus may be picked off the mucus membrane and examined for ameba. The probable cause of the repeated accumulations of pus in the anal region is failure to get adequate draining. Examine the bowel for an internal opening of a fistulous tract and open widely to this point. Both the internal and external sphincters should be cut through so the base of the cavity is completely exposed.

NEW AND NON-OFFICIAL REMEDIES

ABBOTT LABORATORIES
Viosterol-Abbott

BENZOL PRODUCTS CO.
Neocinchophen-B. P. C.

DICK X-RAY CO.
I-X Barium Meal

PARKE, DAVIS & CO.
Parke, Davis & Co.'s Viosterol

E. R. SQUIBB & SONS
Viosterol-Squibb 100 D
Squibb's Viosterol Cod-Liver Oil 5 D
Squibb's Viosterol Cod-Liver Oil 5 D Mint-Flavored

TERRELL'S LABORATORIES
Rabies Vaccine Phenolized, Terrell

TRUTH ABOUT MEDICINES

Isarol-Ciba—Sulphonated Bitumen, N. F.—A preparation obtained by dry distillation of bituminous shale. The distillate is sulphonated with sulphuric acid and subsequently neutralized with ammonium carbonate. The product complies with the standards for sulphonated bitumen, N. F. It has the actions and uses of sulphoichthyolate preparations and substitutes (New and Non-official Remedies, 1929, p. 398). (Jour. A. M. A., July 6, 1929, p. 33.)

Ampoules of Pitressin.—An aqueous solution containing the pressor and diuretic-antidiuretic principle of the posterior lobe of the pituitary gland (betahypophamine) containing less than 1 unit of oxytocic activity per c.c. It is standardized by the method of Hamilton and Rowe so that each c.c. contains 20 pressor units (1 unit represents the pressor activity exhibited by 0.5 mg. of standard powdered pituitary U. S. P.). This product is used for temporary stimulation of blood pressure, for increasing the muscular activity of the bladder and intestinal tract, also for anti-diuretic effect in diabetes insipidus. It is marketed in 1 c.c. ampoules. Parke, Davis & Co., Detroit.

Ampoules of Pitocin.—An aqueous solution containing the oxytocic principle of the posterior lobe of the pituitary gland (alphahypophamine) containing less than 0.5 unit of pressor activity per c.c. It is standardized by the U. S. P. method for pituitary, each c.c. containing 10 International units. This product is used to stimulate uterine contractions for obstetric purposes. It is marketed in 1 c.c. ampoules. Parke, Davis & Co., Detroit. (Jour. A. M. A., July 13, 1929, p. 117.)

Rabies Vaccine (Phenolized).—An antirabic vaccine (New and Non-official Remedies, 1929, p. 356) prepared according to the general method of David Semple (phenol-killed). It is marketed in packages of 14 vials, each containing 3 c.c., and in packages of 21 vials, each containing 3 c.c. Terrell's Laboratories, Fort Worth, Texas. (Jour. A. M. A., July 27, 1929, p. 283.)

OF GENERAL INTEREST

Dr. A. L. Arends, formerly of Saint Paul, has moved to Wright, Minnesota.

Dr. and Mrs. Emil Geist of Minneapolis have returned from an extended trip abroad.

Dr. and Mrs. Archie H. Beard of Minneapolis have returned from a three months' trip abroad.

The twelfth annual meeting of the American Dietetic Association will be held in Detroit, Michigan, October 6 to 11, 1929.

Dr. and Mrs. C. C. Chatterton of Saint Paul have returned from Europe, where they spent two months in England and France.

The marriage of Miss Cordelia Pond and Dr. Henry E. Wunder, of Shakopee, Minnesota, took place August 1, 1929. Dr. and Mrs. Wunder will make their home in Shakopee.

Dr. Owen W. Parker of the Shipman Hospital Staff, Ely, Minnesota, and his son, Addison, have returned from a recent scenic and historical tour of the Eastern States and Canada.

Word has been received of the death of Mrs. W. M. Dodge, wife of Dr. W. M. Dodge of Farmington, Minnesota. Besides her husband, Mrs. Dodge is survived by a daughter, Miss H. L. Dodge, and a son, Dr. W. M. Dodge, Jr., both of Minneapolis.

Mrs. Mary Coventry of Duluth, mother of Dr. W. A. Coventry, died at the age of 78 years, in July. She is survived by two sons, Dr. W. A. Coventry of Duluth, and Dean Coventry of Willmar, and two daughters, Mrs. James Shaw of Duluth and Mrs. D. L. Fairchild, Willmar.

Mrs. A. T. Caine, wife of Dr. A. T. Caine, superintendent of the state hospital for insane at Anoka, Minnesota, died Tuesday, July 16, 1929, following an illness of three weeks. She is survived by her husband, a daughter, Helen B. of Wellesley, Massachusetts, and a son, William.

A series of one-day post graduate courses will be held at the tuberculosis sanatoria of the state during the latter part of October. These will be for the physicians of the state of Minnesota only and will be held at the following institutions: Fair Oaks Lodge, Wadena; Sand Beach Sanatorium, Lake Park; Sunnyrest, Crookston; Pokegama Sanatorium, Pine City; Southwestern Sanatorium, Worthington, and the State Sanatorium at Walker. A more detailed announcement will appear in the October number of MINNESOTA MEDICINE.

TRANSACTIONS OF THE MINNEAPOLIS SURGICAL SOCIETY

Meeting of May 2, 1929

The regular monthly meeting of the Minneapolis Surgical Society was held at the home of Dr. H. B. Sweetser, Sr., Thursday evening, May 2, 1929. The meeting was called to order at 8 p. m. by the President, Dr. S. H. Baxter.

Dr. E. C. ROBITSHEK presented two cases, in which the adhesive plaster method for the rapid regeneration of skin over granulating wounds had been very successfully employed. Before the cases were presented, a brief description of the method of application was made, and an explanation given of the rapid epithelial growth, with this method of treatment. This method was successfully employed in the treatment of chronic ulcers thirty years ago, and is still being used, though unfamiliar to many physicians.

The first case presented was that of a young woman, who suffered an x-ray burn over the upper and mid-dorsal spinal region. The burn was irregular in shape, but measured about 15 cm. by 12 cm. at its greatest length and width. This burn was the result of a fluoroscopic and x-ray examination made about March 19, 1926. The patient entered the Minneapolis General hospital in July, 1926. The family history was negative. She had previously undergone an operation for appendicitis and had had a gastroenterostomy, directly following the x-ray diagnosis of the same, when the burn developed. The patient was first seen on August 1, 1926, previous to which time various medications had been used in an effort to heal the burn, but with little success. On August 13th, she was taken to the operating room, with the hope that by excising the ulcer and its base improvement might result and a granulating base for a skin graft result. The wound became infected and Dakinization was resorted to. When the area appeared healthy, and active granulation taken place, it was decided to treat this area with the adhesive tape method. Improvement at once took place. The patient left the hospital on January 17, 1927. Since that time it had been necessary to operate twice on this patient, the first time for multiple fibroids, a subtotal hysterectomy, and ten months later for an acute intestinal obstruction, due to adhesions, at which time about eight inches of gangrenous bowel were removed and an end-to-end anastomosis performed.

The second case presented was that of a woman, who was a washerwoman by occupation, who on the 1st of March, 1929, caught her right hand in a wringer and suffered an almost complete avulsion of the skin of the dorsum of the hand. The thin skin sloughed out, leaving an exposed area over the back of the hand about 8 cm. in diameter. Under adhesive strip taping, the open exposed area had entirely healed, so that at this date, the patient was working again at her occupation.

This form of treatment for the rapid regeneration of skin over granulating wounds is, in my opinion, a

most satisfactory method in every way. Dressings need be changed but once or twice a week, the method is most simple, no special care being necessary so as not to infect the wound area, the treatment is painless, and when once the skin surface is healed the skin is firm and pliable. The advantages over skin grafting are no second raw skin area, no pain, and no danger of infection. However, to attain the best results, details must be carefully attended to. These, however, are trivial.

DISCUSSION

Dr. O. H. WANGENSTEEN; Dr. Robitshek has presented a very useful method of covering skin defects. An ordinary defect will heal without much trouble if kept clean. Carrel and de Nöuy, during the war, expressed in a formula the rate of healing in a wound. A larger defect heals relatively more quickly than does a smaller one. They found that if infection supervened in a wound the rate of healing was delayed.

Skin grafting is a method employed to accelerate wound healing. In 1920, Wilhelm Braun of the Friedrichshain Hospital in Berlin employed a new method of skin grafting. It is a very simple but effective manner of covering a denuded area. An advantage of the method is that it can be employed where other methods of skin grafting would not work.

The method consists in the implantation of small pieces of skin about 2 to 4 sq. mm. in size, into the granulations, in such a way that the implant just disappears from sight, much in the manner in which potatoes are planted in the ground. The skin is ob-

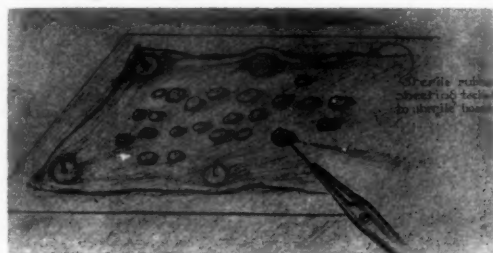


Fig. 1

tained by cutting the skin as one ordinarily does for a Thiersch graft, and cutting it into small pieces. The only condition that must be fulfilled in employing the method is that granulations must be present. The method, however, works well in the presence of infection, and it is not necessary that the granulations be healthy. I have implanted these grafts, with a satisfactory result, into the granulations of a wound in which the wound edges have separated and feces from a colostomy are poured over the wound. I first employed the method last September in a man who had had a thigh amputation for arterio-sclerotic gangrene of the leg. A large pressure sore developed just over one of the ischial tuberosities, with considerable undermining of the skin. As soon as granulations appeared in the wound, these grafts were implanted and

with surprising rapidity the defect became covered with epithelium.

When these grafts are submerged beneath the granulations, they lie dormant for awhile and can not be seen. An area rather pale in appearance becomes apparent after five to eight days where the implanta-

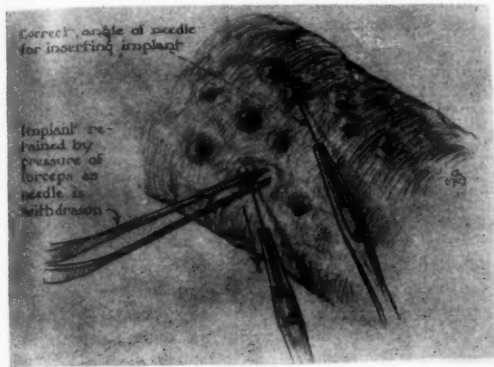


Fig. 2

tion is done. An area of depression then occurs in the granulation tissue, immediately about the implant (this apparently only occurs when large implants are used, and I believe it represents an expression of a natural antagonism between epithelium and granulation tissue). Then, almost from day to day, the wound defect appears smaller, a white film of epithelium, propagated in part from the margins of the wound and partly from the independent growth of the grafts, spreads over the surface of the defect. The last portion of the wound is the slowest to close.

Directly after the implantation, the wound is covered with strips of sterile vaseline gauze. No pressure is applied. After three or four days these are removed, and the wound is covered with a double thickness of gauze, and Dakin's solution is poured on sufficiently frequently to keep the wound clean and free from discharge. There is no danger in washing the grafts off by this method.

Soon after Braun's publication of the method, Pels-Leusden macerated skin and injected it subcutaneously with a syringe, with the same result. These grafts are really a tissue culture in vivo, and undoubtedly these grafts have a much better chance to survive than those laid on the surface, as in the Reverdin and Thiersch methods.

We have employed the method now at the University Hospital in more than twenty cases. In many of these instances, it has been employed where the ordinary Thiersch and Reverdin grafts would have proven satisfactory. The absolute indication for the method is where other methods would fail, as in osteomyelitic cavities, chronic empyema cavities, large pressure sores, etc. In one patient suffering from a paraplegia from a metastatic carcinoma of the cervix uteri to the lumbar spine, who developed a deep pressure sore over the sacrum, I used the method. Just before death occurred some weeks later, a photograph showed that

the defect was practically healed. The healing had taken place even though the patient lay on her back a good deal of the time and in spite of urinary and fecal incontinence.

The cosmetic result in some extensive burns, in which we have employed these implants, has not been above criticism. In others, however, in which the local destruction of the burn has been less intense, a very satisfactory cosmetic result has followed. Unlike the small deep graft, this implant fuses with the rest of the skin and does not preserve its identity. A very large defect can be covered with a small amount of skin by this method. It is a mode of skin grafting that can be used on ambulatory patients, and on occasions we have used it in the outpatient department. I am certain that anyone who gives the method a trial will be pleased with the results.

DR. A. A. ZIEROLD: This method of which Dr. Wangenstein speaks recalls my experience with the method of Pels-Leusden when it came out in 1921. I tried his method of making a pulp of the papillary layer of the skin and injecting very deep under the granulations with a paraffine syringe. It isn't nearly as easy as it sounds and in my hands it wasn't entirely satisfactory. Its chief advantage is that you can use it in infected fields. To overcome these difficulties I have been using Reverdin grafts implanted with a sharp pointed forceps. In talking with Dr. Wangenstein I find his method is practically the same and the end-result is the same. The papillary portion of the skin is used and it is planted deeply beneath the granulations where it is perfectly protected. Pels-Leusden has some microscopic sections wherein he shows the epithelium growing out from the deep layers in a fungating mass. You can dress them with almost anything. You can put gauze on or wipe off the surface and you won't wipe off the graft.

I recall this case of Dr. Robitshek's very well. When I first saw it it was a circular excavated wound and to my recollection it was about 2 cm. deep. I very promptly passed the case on to Dr. Robitshek, who worked it out very nicely as you have seen tonight. You all know the difficulties in getting a surface over x-ray burns.

DR. R. C. WEBB: It appears to me that there is still a great deal of difference of opinion as to the value of the different methods of obtaining healing of a wound. When I was a medical student I recall one of Doctor Halsted's Friday clinics in which he spent the entire hour discussing this very problem, using a leg ulcer case as his subject. The field of surgery can be extensively discussed and demonstrated with an ordinary leg ulcer and it is remarkable how many previously unthought of points can be brought out by a master of the subject. The blue line which surrounds a healing wound is produced by a thin layer of epithelial cells which can be seen with the naked eye. There is also a line of epithelial cells extending inward over this raw area which cannot be seen and which must be considered and protected.

Previous to 1916 when Carrel brought this subject to our attention and placed it on a scientific basis we heard many methods of treatment advocated and when we stop and think we must remember that these were merely the guesses of the advocates. In general we hear more of the more dramatic surgical problems and many recent graduates know very little of the problem now being discussed. The controversy which accompanied the Carrel treatment obscured many of the valuable points brought out by him, which probably accounts for the continued guessing as to the value of various salves, etc. The formula worked out for Carrel by Du Nuoy furnished a method of eliminating guesswork. In 1917 at the Rockefeller Institute in New York, Carrel showed by using neutral soap that a wound when kept bacteria-free would follow Du Nuoy's curve. The problem of the healing of wounds was very acute during 1917 and often does not get the continued attention deserved.

DR. H. O. MCPHEETERS: This method of Dr. Robitsek's is very interesting. I think it was first brought out by Boynton. He would strap the foot and lower leg with strips of adhesive one inch wide, beginning at the toes and working upward to the knee. Each succeeding strip would overlap the last one by $\frac{1}{4}$ to $\frac{1}{2}$ inch and would overlap in front. In this way he would make an adhesive cast for the entire lower leg and foot. This was left in place seven to ten days at a time, leaving the ulcer area bathed in a lake of secretions. Following this Nobl added the rubber sponge pressure to get rid of the coarse hydropic granulations. The adhesive accomplishes the same purpose though not so efficiently. About one year ago Nejorotti wrote a very good paper on this same subject.

The Minneapolis Surgical Society prize essay for 1929, "The Afferent Nerve Supply of Blood Vessels," was read by Mr. Miland Knapp of the University of Minnesota. (This paper will appear in a later issue of MINNESOTA MEDICINE.)

THE PRESIDENT'S ADDRESS

DR. STEPHEN H. BAXTER: It is with sincere appreciation that I acknowledge the honor of serving this Society as its President during the past year. Our Society is still young. Like a child who must pass through a period when nobody loves him but his mother, a Society cannot expect much recognition until it has acquired a little age—until some history is behind it—some record of accomplishment. It is confidently hoped that with the passage of time the members and officers who helped to found and establish it will feel an increasing pride in the part they played in its early history.

Time is essential to the growth of tradition. Character develops as a result of trial, of experiment, and of the final rejection of things that fail and the adoption of things that succeed. The Society has passed through several grades of education by trial and error

and is gradually, let us hope, acquiring traditions and assuming some semblance of permanent character.

The plan proposed and put into operation by Dr. H. B. Sweetser at the beginning of his term as President two years ago seemed worthy of further trial during the year now closing. The attendance and interest shown in the meetings have, it seems to me, given evidence that the members approve of the plan of holding our meetings at private homes, where, without detracting from the value and interest in the scientific program, an air of informality and goodfellowship may prevail. In the name of the Society I wish to extend to the hostesses who have so graciously entertained us an expression of our appreciation of their hospitality.

The former dinner meeting held once a year, with a distinguished guest as speaker, has now become a tradition with us. These meetings are becoming increasingly successful and I hope that the custom will be permanent.

We have, then, some traditions, some character, sufficient history behind us to establish the right to live. But mere existence is not enough. There must be advancement, there must be growth, otherwise we must come under the operation of the law referred to in the parable and "from him that hath not, will be taken away even that which he hath." Is it too much to hope that from this Society there may emerge something of outstanding value to the science and art of Surgery?

We are sometimes inclined to be a little supercilious in our attitude toward surgeons of a hundred, or even fifty, years ago. "Hospital gangrene," wrote Samuel D. Gross, "owes its origin to a species of blood-poisoning depending upon a foul, infected atmosphere, operating upon a depraved and enfeebled constitution." Discussing dissection wounds, he says, "Of the nature of the poison nothing whatever is known. It is supposed that it is generated a short time before death, during the act of dying, or soon after dissolution, and that it is dependent for its development upon a vitiated state of the blood, though that state has not been pointed out. The poison is most virulent when it is communicated by persons dead of puerperal fever, erysipelas, carbuncle, pyemia, and other kindred affections." Quoting Gross again, "The causes of erysipelas are too numerous and diversified to admit of any very definite specification. It may be assumed that whatever has a tendency to disorder the digestive, hepatic or any other important function is capable of producing the disease—a vitiated state of the atmosphere—and whatever else has a tendency to weaken the corporeal faculties, may be enumerated as so many causes of the disease. Of the causes of anthrax or carbuncle, nothing whatever is known."

Such quotations from the writings of one of the greatest surgeons of his day invoke in us a feeling of complacent superiority, of indulgent self-satisfaction.

Dr. J. J. Woodward, a United States Army Surgeon in the Civil War, reported to the Surgeon-General that a microscopical examination of the slough in a case of hospital gangrene fails to reveal "any cryptogamic or-

ganism except the vibrios which are to be observed in every decomposing animal substance." It seems incomprehensible and almost inexcusable to us that these vibrios should be dismissed in such casual fashion, and yet I have no doubt that fifty years hence the same astonishment will be expressed over the Woodward of our day who, having eyes, see not, or, seeing, do not perceive that which will have become obvious in the light of greater knowledge.

To whom do we owe the conquest of infection? To a chemist who used his eyes; whose first triumph came by the discovery that crystals of tartaric acid, which all other scientists had regarded as similar, were in reality dissymmetrical, that they could be divided into groups according to their form, and that solutions of the different groups had each its own peculiar effect on polarized light. This same faculty for observation led him out of the field of strict chemistry into the investigation of the processes of fermentation. A manufacturer of beet-root alcohol had had an inexplicable failure in some part of the process and asked the chemist to try to find the cause. He soon observed that the globules in the fermenting juice were of one shape when the fermentation was normal, but that they were of a different shape if the fermentation became lactic.

From these studies came as a natural consequence the investigation of the phenomena of fermentation and putrefaction in general, and in these investigations, to supplement the faculty of observation, the experimental method was employed. It is apropos at this point to quote the words of Pasteur himself in distinguishing the art of observation from the art of experimentation. "In the first case, the fact may either proceed from logical reasons or be mere good fortune; it is sufficient to have some penetration and the sense of truth in order to profit by it. But the art of experimentation leads from the first to the last link of the chain without hesitation and without a blank, making successive use of Reason, which suggests an alternative, and of Experience, which decides on it, until, starting from a faint glimmer, the full blaze of light is reached."

Although Science looks ever forward and has no place for complacent retrospection, it is at once a challenge and an inspiration to consider some of the great accomplishments of the past. The quotations I have given from Gross, and the classical paper by Holmes on puerperal fever with its reiteration time after time of the same story of tragedy following in the wake of ignorance, are sufficient to show us the contrast between the era preceding Pasteur and that following his discoveries. His epoch-making studies of fermentation and of the diseases of beer and wine led his admirers to think that nothing was impossible to him and, although he knew nothing about silk-worms, to him was assigned the task of saving the silk industry from destruction by a disease that had baffled all attempts to control it. With no precedent to guide him, he blazed his own trail and complete success was won only after five years of labor. Anthrax and chicken cholera, which also were diseases seriously affecting the prosperity of the agricultural districts, were studied, the

cause discovered, and remedies found. During the investigation of chicken cholera came accidentally one of Pasteur's greatest discoveries, that of attenuated virus and its power to protect the body against subsequent inoculation with virulent micro-organisms. I have said that this discovery came accidentally; the combination of circumstances surrounding the discovery may have been accidental but "chance only favors the mind which is prepared." The use of attenuated virus was then tried for the protection of animals against anthrax and the story of these experiments and of the battle against prejudice and ignorance is one of the most interesting and dramatic in the history of medicine. The cause of furunculosis was demonstrated and a case of osteomyelitis, after a similar organism had been discovered in it, was described as "furunculosis of bone." Finally and most dramatic of all were the studies of rabies, culminating in the decision to try the new remedy, which had proven successful in protecting dogs, on a human being, and the name of Joseph Meister became immortal in medical annals.

I have said that it is at once an inspiration and a challenge to consider some of these great achievements of science. An inspiration because no problem in medicine of the present day is more baffling than was the problem of infectious disease before Pasteur. Our attempts to elucidate the cause of cancer are as satisfactory (but not more so) as were those of a former generation to understand the cause of tuberculosis. But there is also the challenge of problems to be solved in every department of medicine and surgery. From the earliest dawn of history, fractures have constituted the most obvious condition requiring surgical treatment, yet one of the principal endeavors of the College of Surgeons today is to attempt to standardize the treatment of fractures. The technic of intestinal anastomosis, elemental as that may seem, cannot be considered as perfected. No perfect method has been devised and the Journals still publish descriptions of new procedures. The true cause of diabetes is unknown. Banting and Best, it is true, have given us something more than "a faint glimmer" but it remains for future investigation to illuminate the problem with a "full blaze of light." With respect to cancer, we have hardly so much as "a faint glimmer" and yet the demand for a solution of the problem becomes more and more insistent. A glory equal to that of Pasteur's awaits him who can discover its cause and point the way to a really rational and scientific treatment.

Unexplored territory is everywhere around us and our Society can justify its existence and grow in strength and influence by encouraging excursions into these unknown regions. Let us, therefore, each of us, contribute his bit to the common fund of knowledge. Every fragment of truth has some value, and what may to one man appear only an isolated fact, may to another be that "faint glimmer" which can be fanned into the "full blaze of light."

The meeting adjourned.

THEODORE H. SWEETSER, M.D.,
Secretary.

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

MEDICINE

SUPERVISORS:

F. J. HIRSCHBOECK,
205 W. 2nd STREET, DULUTH

THOMAS A. PEPPARD,
LA SALLE BLDG., MINNEAPOLIS

PREVENTIVE TREATMENT OF COLDS AND ASTHMA WITH VACCINES: Chandler Walker (Arch. of Med., Vol. 43, April, 1929, No. 4). Autogenous vaccines were made of every patient annually, in the autumn. Eight varieties of hemolytic and eight of non-hemolytic streptococci were found, in different patients. The types and proportions present of these varied considerably from year to year. These vaccines were pooled, this making an annual stock vaccine, representing strains of streptococci isolated from ninety-seven patients, thirty-seven of whom were children. Some of these suffered from recurring colds, while others were afflicted with asthma accompanying the colds. Eighty-four per cent required only one course of vaccine annually. Sixteen per cent were given a second course in the spring because of recurrence of infections. Reduction in the frequency and severity of attacks of colds and asthma occurred in 95 per cent of the cases. The best results were obtained in children who suffered from colds only; the least benefit was derived by adults who had asthma associated with colds. Children who had asthma with colds, and adults who were susceptible to colds only, obtained considerably better results than those cases in adults in whom asthma was associated with colds.

The mixed streptococcus vaccine contained 100,000,000 organisms per minim, or 1,500,000,000 per cubic centimeter. The treatment consisted of weekly subcutaneous injections beginning with 3 minims, and increasing 1 minim weekly for eight or ten weeks. If a dose caused much local or general reaction, it was repeated unincreased. For infants and young children the vaccine was diluted to one-half strength. Treatments were usually given in the fall and early winter.

THOMAS MYERS, M.D.

SURGERY

SUPERVISORS:

DONALD K. BACON,
LOWRY BLDG., ST. PAUL

VERNE C. HUNT,
MAYO CLINIC, ROCHESTER

THE URACHUS AND UMBILICAL FISTULÆ: R. Campbell Begg, Wellington, New Zealand (S. G. & O., Vol. XLV, Aug., 1927, No. 2, p. 165). The writer presents a very interesting record of the subject. The bladder in the 10 to 24 millimeter embryo is derived from the ventral cloaca and extends to the umbilicus. A narrowing of the upper part, as development progresses, forms the urachus. At birth the urachus reaches the umbilicus and is attached at the apex by three fibrous strands, one to each umbilical artery and one into the umbilical cord. The bladder descent begins at birth, dragging with it the urachus and its attachments.

As a result of this process in the adult we have an average urachus of 5 cm. passing up from the anterior bladder wall just below the apex. The upper extremity is fully 11 to 12 cm. from the umbilicus, being connected, however, by a fibrous cord or Luschka's plexus.

The two features commonly described of the urachus: (1) that it reaches from the umbilicus to the bladder, and (2) that its canal is obliterated to form a fibromuscular cord. However, these are wrong in the adult. The urachal canal remains patent—in part at least—throughout life, being lined by transitional epithelial cells without a basement membrane. In 33 per cent of cases a direct communication exists between the bladder and lower urachus. In the others, though patent, the urachus ends blindly.

The blood supply of the urachus is generally from the left superior vesical artery. It can be traced to the apex of the urachus and along the allantoic remains to the umbilicus.

As far as anomalies go—extroversion of the bladder presents a typical picture of non-descent of the bladder and non-formation of the urachus.

Acquired urinary fistula at the umbilicus is never due to a patent or persisting urachus. The explanation lies rather in dilatation, pressure and sepsis of lower urachus, where it communicates with the bladder; a giving way and a leakage of urine along a linear channel bounded by transversalis fascia in front, the peritoneum behind and the obliterated fibrous hypogastric arteries on either side, to the comparatively thin partition between itself and the floor of the umbilical depression, where it may break through.

Congenital umbilical fistulæ are due to non-descent of

the bladder and failure to form a urachus. Only some 56 cases have been reported.

The author also presents a logical explanation for the separation of the umbilical cord in the new-born. The umbilical arteries, being ligatured an inch or two from the body, obliterate as far as the nearest collateral branch—the superior vesical arteries. The vein obliterates as far as the liver. Wharton's jelly having lost the nutriment supplied by the liquor amnii, and the arterial and venous coats being now deprived of the blood in their lumen, no life remains in the stump of the cord, and a line of demarcation appears at the skin which is provided with other arterial supply and a normal procedure is enacted.

CHARLES W. MAYO, JR., M.D.

LEFT VAGUS SECTION AND PARTIAL GASTRECTOMY FOR DUODENAL ULCER WITH HYPERACIDITY: Eugene Klein, New York (Ann. of Surg., XC, No. 1, July, 1929, p. 65). The theory of partial gastrectomy for gastroduodenal ulcer is based on two principles:

1. Removal of the ulcer and the area in which ulcers most commonly occur.
2. Free hydrochloric acid in the gastric contents is usually markedly decreased or eliminated.

He states the belief that gastrojejunal or jejunal ulcers rarely, if ever, occur in an anacid medium, and tabulates the phases of gastric secretion as follows:

- a. Primary or psychic
- b. Secondary or gastric
- c. Intestinal
- d. Continuous

Following partial gastrectomy, six months postoperative, 25 per cent of patients showed anacidity, 41 per cent hypoauidity and 17 per cent still had a hyperacidity.

In this last group of 17 per cent falls the recurring type of ulcer; the preoperative acidity has been high and they have been of the "nervous type."

As a means of dealing with the above group, section of the left vagus, which sends branches to the anterior half of the body and the fundus of the stomach, was done on the lesser curvature—this in combination with partial gastrectomy. It is a simple additional procedure and by putting the lesser curvature on stretch the nerve can be felt as an inelastic band. The primary and continuous phases of gastric secretion are thus believed eliminated.

Eight cases chosen because of marked hyperacidity done after the method described showed anacidity from two to five months postoperatively.

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DIPHTHERIA FATALITIES WITH SPECIAL REFERENCE TO CIRCULATORY FAILURE: Joseph Greengard, M.D., Chicago (Arch. of Ped., July, 1929, Vol. XLVI, No. 7). At the present time, diphtheria is looked upon as one of the medical problems whose solution has been practically accomplished. In spite of these facts, a considerable number of rapidly fatal cases of diphtheria are still seen, and the question arises as to the exact nature of the factors responsible for them. In an attempt to clarify this situation, an analysis of 116 fatal cases of various forms of diphtheria has been prepared for discussion.

The outstanding catastrophe in diphtheria at the present time is represented by the case evidencing what may best be termed circulatory collapse. In most instances distinct evidences of myocardial damage are apparent clinically and pathologically.

Warthin reported the pathologic findings in a series of cases in which the essential cardiac changes consisted in a myocardial degeneration due to the direct action of the toxin upon the cardiac musculature.

Harding presents still another explanation of the sudden fatal syncope on the basis of an oligemia, which is partly due to an actual diminution of the circulating medium, but is largely a distributive oligemia due to the collection of large quantities of blood in the dilated splanchnic plexuses. As a result of this oligemia, anemia of the medullary centers occurs. In addition to this, a peripheral circulatory factor undoubtedly exists and plays an important role in the sudden fatal syncope.

Definite increase in the size of the heart as noted on physical examination was found in 33 cases. The character of the heart tones was distinctly altered in every case, the tones being soft, blurred, and distant in contrast to the clear-cut snappy sounds heard prior to myocardial involvement. A definite, soft systolic murmur over the precordium was heard in 26 cases.

Among the disturbances of rhythm, gallop rhythm is of considerable importance in the diagnosis and prognosis of diphtheritic myocarditis. It was noted in 13 of these cases. In acute diphtheria the occurrence of gallop rhythm may be looked upon as definite evidence of myocardial involvement and as a grave prognostic omen.

The early and liberal administration of diphtheria antitoxin is the factor of prime importance here. It is to be noted that one-third of these cases received no antitoxin before entering the hospital and almost

another third were given some antitoxin, but much less than is adequate. In neglected, highly toxic cases, large doses of serum, 30,000 to 40,000 units, should be given intramuscularly as soon as the child is seen and repeated with smaller doses on the succeeding days, if no improvement is noted. Adrenalin plays an important role in the therapy of these cases and should be given hypodermically throughout the course of the illness. Strychnia and caffeine are indicated as circulatory stimulants in these cases.

Fluids must be administered freely. The administration of glucose solutions has a distinct and lasting effect on the circulation. A 10 or 20 per cent solution of glucose is given intravenously, or by deep intramuscular injections into the thighs.

Once evidences of myocardial involvement have been manifest, the outlook is distinctly not good, despite any measures that are instituted.

R. N. ANDREWS, M.D.

MALIGNANT DIPHThERIA: Philip S. Potter, M.D., Berkeley, Calif. (Arch. of Ped., July, 1929, Vol. XLVI, No. 7). Malignant is the designation applied to the very worst of the severe cases of diphtheria, such as may be due either to an extraordinary virulence of the bacteria or to a high degree of individual susceptibility.

Morgan suggests that the disease itself may be a bacteremia and reports a case in which the diphtheritic bacilli were found in the heart's blood.

Malignant diphtheria may set in with such incredible swiftness and violence that all resistance is battered down and death takes place within 24 to 48 hours. The skin of the patient appears dusky and in some instances covered with small purpuric spots. The eyes are dull and from the open mouth or red swollen nostrils blood or blood stained serum may flow or hemorrhages may take place from various other mucous membranes.

The cervical lymph nodes and the cellular tissue of the neck are greatly swollen, sometimes to such an extent that the head is held stiffly backward. The soft parts of the pharynx are excessively swollen and in some instances the tonsils are so swollen that they push the elongated uvula either backwards or forwards.

The tonsils, uvula, pillars, palate, posterior pharyngeal wall and not rarely the soft palate are covered with a slimy grayish yellow or blackish membrane dotted with points of hemorrhage and in some instances the whole process becomes necrotic and gangrenous.

The uncovered mucous membrane is swollen, intensely red and also shows isolated areas of bleeding. The tongue is heavily coated with a brown or blackish slimy deposit. The breath has a dead smell and the mucous secretion is greatly increased.

The temperature may remain persistently high or it may be only slightly elevated, but as a rule it falls to or below normal by the second day. The pulse is very rapid, small and compressible.

As a rule the larynx and the trachea are not affected, or, if so, marked stenosis rarely occurs.

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TUMORS OF THE KIDNEY: B. H. Nichols, M.D. (Am. Jour. Roent., V, XXI, p. 582-588). The author uses the modified classification of Garceau (as published in 1909) and adopted by Chetwood, which seems most applicable to roentgenologic studies.

Any deformity of the renal pelvis or calyces may suggest the presence of a renal neoplasm, the location of which is indicated by the type of deformity or distortion. Tumors of the cortex either compress or elongate the adjacent calyx by compressing the infundibulum and this may result in dilation or obliteration of the distal end of the calyx.

A complete understanding of the gross pathology, together with the characteristic manner of growth, is most helpful in the roentgenologic diagnosis of renal tumors.

Hypernephroma.—Hypernephromata may be irregular in shape and nodular, in which case the shape of the kidney shadow will be affected, or they may be small and confined to the kidney cortex. When the tumor penetrates its capsule it may invade the kidney substance, branches of the renal vein or the pelvis of the kidney. Metastases through the blood stream occur usually in the chest, long bones or skull. They may occur in any portion of the body. These tumors may also metastasize through the lymphatics. In its early stage a hypernephroma is comparatively benign; hence the importance of its early recognition and removal.

Carcinoma.—The classification of carcinoma may be confused with hypernephroma. Carcinoma shows little tendency to displace the calyces or pelvis of the kidney. They are usually smaller, of much greater malignancy than hypernephroma, and extend to neighboring glands, but may metastasize to the lungs or the liver.

Sarcoma.—Sarcoma usually attacks capsule or perirenal tissue and thus does not produce changes in the renal pelvis but may be detected in the plate by irregularities in the kidney outline. In children they are a mixed tumor rather than a true sarcoma, and often attain large sizes, filling the entire abdomen. The

palpable mass is usually the first recognizable symptom as it rarely causes urinary changes.

Benign tumors.—These are rare.

Embryonic tumors.—There is no characteristic picture by which embryonic tumors may be recognized.

Tumors of the renal pelvis.—These produce deformity of the renal pelvis in their early stages.

Solitary cyst.—A benign condition which produces symptoms only by mechanical pressure.

Polycystic kidney.—Usually bilateral, polycystic kidney is probably a congenital condition and usually a familial disease. The encroachment of the cortical cysts on the calyces and kidney pelvis causes the visible changes and may be confused with deformity caused by other types of renal neoplasm.

Usually the history, urinary findings and cystoscopic observation, together with the comparison of function in the two kidneys, are necessary for a correct diagnosis.

JACOB SAGEL, M.D.

RADIATION THERAPY IN THE TREATMENT OF SOME BENIGN AND MALIGNANT TUMORS; WITH PARTICULAR REFERENCE TO THE RESULTS OBTAINED AT THE RADIUM CENTER IN COPENHAGEN: Edv. Collin (*Acta Radiologica*. Vol. X, Fasc. 2, April 30, 1929, No. 54). A survey of the results obtained at the Radium Center following irradiation with radium and roentgen rays is made on 1,650 cases. These results are all based upon at least a five-year follow-up observation and treatment. Benign lesions such as angiomas, keloids, and warts respond very well to radium application, especially angiomas less than 2 to 3 cm. in diameter.

Malignant lesions about the face respond very well to radium as does cancer of the lip, the percentage of cures being 72 per cent and 74 per cent, respectively. No five-year cures are reported for malignancies of the esophagus, larynx, breast, thorax, rectum, or penis. The writer ascribes a large part of this to the fact that irradiation therapy is only of recent adoption in Copenhagen, and that at first only inoperable cases were sent to the radiologist.

It is pointed out that many cutaneous cancers which are resistant to roentgen rays will respond very well to radium therapy. Radium is used in preference to roentgen therapy whenever possible, and a combination of irradiation and surgery is carried out whenever indicated.

HARRY HILLSTROM, M.D.

LOBAR AND CENTRAL PNEUMONIAS IN CHILDREN: F. B. Stephenson (*Am. Jour. Roent.*, June, 1929, 21:571). The author states that in all inflammations of the lung the primary physical reaction is congestion or engorgement of capillaries and

is followed by infiltration of extracapillary tissue and exudation into the air sacs which manifest themselves on the roentgenogram as areas of increased density. This change, while usually due to the pneumococcus, may also be caused by other organisms.

A short description of the topography of the child's chest as compared to that of adults is given. Consolidation may progress from the periphery inwards, from within outwards, from below upwards or from above downwards, and may clear likewise or in patches. As to the term "central pneumonia," the application should be to that form which begins centrally in the hilus and extends out into the parenchyma for varying distances without reaching the periphery, in contrast to one beginning in the center of a lobe. The temperature course is so often atypical as not to be dependable for diagnosis. Fifty-two and a half per cent of his series of 100 cases had complications, with otitis media at the head of the list in 30 per cent of the cases, and empyema second with 8 per cent.

The average duration was 7.4 days. The minimum was three days and the maximum twelve days. The age varied from two to sixteen years. The ratio of males to females was 6 to 4.

The author concludes that many inflammations in the lungs resemble the early stages of lobar pneumonia, which do not result in clinical lobar pneumonia, and this fact should be borne in mind in the interpretation of chest films.

JACOB SAGEL, M.D.

BACTERIOPHAGE AS A THERAPEUTIC AGENCY

The bacteriophage has been slow to gain acceptance as a possible agent in the warfare against infection. Recent investigations show the many difficulties connected with the successful use of bacteriophage and also the advantages which they have over other agents. While bacteriophage preparations give promise of eventually becoming valuable additions to the physician's armamentarium, it should be remembered that the whole subject is still in the experimental stage. When vaccine therapy was new and in the ascendancy, manufacturers offered specific vaccines for almost every human ailment and "mixed vaccines" of startling complexity. The Council on Pharmacy and Chemistry not only rejected most vaccine mixtures but has during recent years been obliged to omit a considerable number of simple vaccines because the results obtained with them did not measure up to the evidence which investigators supplied in the height of enthusiasm. Manufacturers are already marketing bacteriophage preparations, simple and mixed. Warrant for the use of such mixtures has not so far become evident and the Council on Pharmacy and Chemistry has postponed the acceptance of simple preparations to await further evidence in favor of their usefulness. (*Jour. A. M. A.*, July 13, 1929, p. 121.)

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